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US ARMY
AVIATION
SYSTEMS COMMAND

THE ADVANCED DIGITAL-OPTICAL CONTROL SYSTEM (ADOCS) USER DEMONSTRATION PROGRAM

Joel L. Terry, Jr., Joseph D. Dickinson, and Major Gary D. Jerauld

September 1989

AVIATION APPLIED TECHNOLOGY DIRECTORATE
US ARMY AVIATION RESEARCH AND TECHNOLOGY ACTIVITY (AVSCOM)
Fort Eustis, VA. 23604-5577

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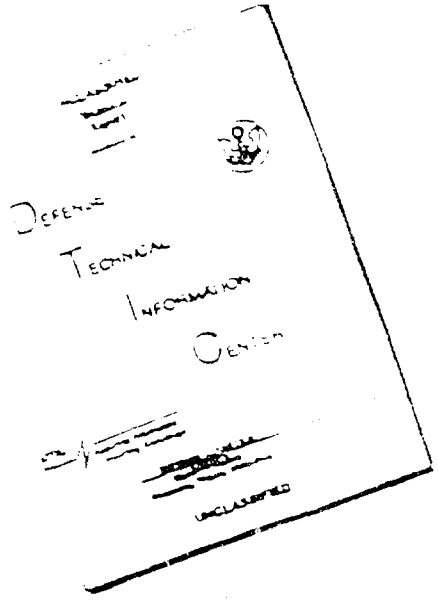

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This report documents the guest/user pilot assessment of the Advanced Digital-Optical Control System (ADOCS) installed in the JUH-60A "Light Hawk" helicopter. The assessment was performed by 76 guest/user pilots from Government, industry, and the news media. Pilot comments were collected on the performance of the ADOCS fly-by-light control system relative to the Primary Flight Control System (PFCS), the Automatic Flight Control System (AFCS) (Core & Selectable Modes), and the force-type sidearm controllers. Several areas for improvements were identified.

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Joseph D. Dickinson	(804) 878-3777	SAVRT-TY-ASI

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PREFACE

The ADOCS User Demonstration Program (UDP) was a joint effort performed by the U.S. Army Aviation Applied Technology Directorate (AATD), Fort Eustis, Virginia, and the Boeing Helicopter Company, Philadelphia, Pennsylvania, under AATD contract DAAK51-82-C-0002. Demonstration flights were conducted from Boeing's Flight Test Center at the Greater Wilmington Airport, New Castle, Delaware. The authors wish to thank the following Boeing ADOCS team members, without whom the program would not have been a success:

Mr. Jim Davis	Program Manager
Mr. Nick Albion	Engineering Manager
Mr. Paul LaSala	Project Engineer
Mr. Steve Glusman	Handling Qualities Engineer
Mr. John Tulloch	DOCS Safety Pilot
Mr. John Bishop	DOCS Safety Pilot
Mr. Bob Rayburn	Test Director

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INTRODUCTION

The Advanced Digital-Optical Control System (ADOCS) contract, DAAK51-82-C-0002, was awarded by the U.S. Army Aviation Applied Technology Directorate (AATD), Fort Eustis, Virginia, to the Boeing Helicopter Company, Philadelphia, Pennsylvania, in November 1981. The objective of this 8-year, multiphase contract was to demonstrate the feasibility and assess the performance of a digital fly-by-light flight control system that could be used in future Army scout/attack helicopters. The contract was initiated with five work tasks:

Task I	Preliminary Design
Task II	Detail Design and Hardware Fabrication
Task III	Helicopter Modification and System Integration
Task IV	Flight Test and User Demonstration Program
Task V	Production Configuration Definition

The contract was subsequently modified to include two additional tasks:

Task VI	Autorotational Control Law Development
Task VII	Control Response Documentation

This report documents the results of the User Demonstration Program (UDP) that was performed as part of Task IV during the period of April through September 1987. The UDP involved flight assessment of the ADOCS JUH-60A Light Hawk helicopter (Figure 1) by guest/user pilots from Government, industry, and the news media. The program was conducted over a 14-week period and involved 76 guest pilots flying the Light Hawk for a total of 126 flight-hours. Demonstration flights were conducted from Boeing's Flight Test Center, Wilmington, Delaware, with one off-site deployment to Fort Belvoir, Virginia, for 1 week of demonstration flying by senior aviators from the Pentagon. The UDP schedule is shown in Figure 2.

Figure 1. ADOCS JUH-60A Light Hawk helicopter.

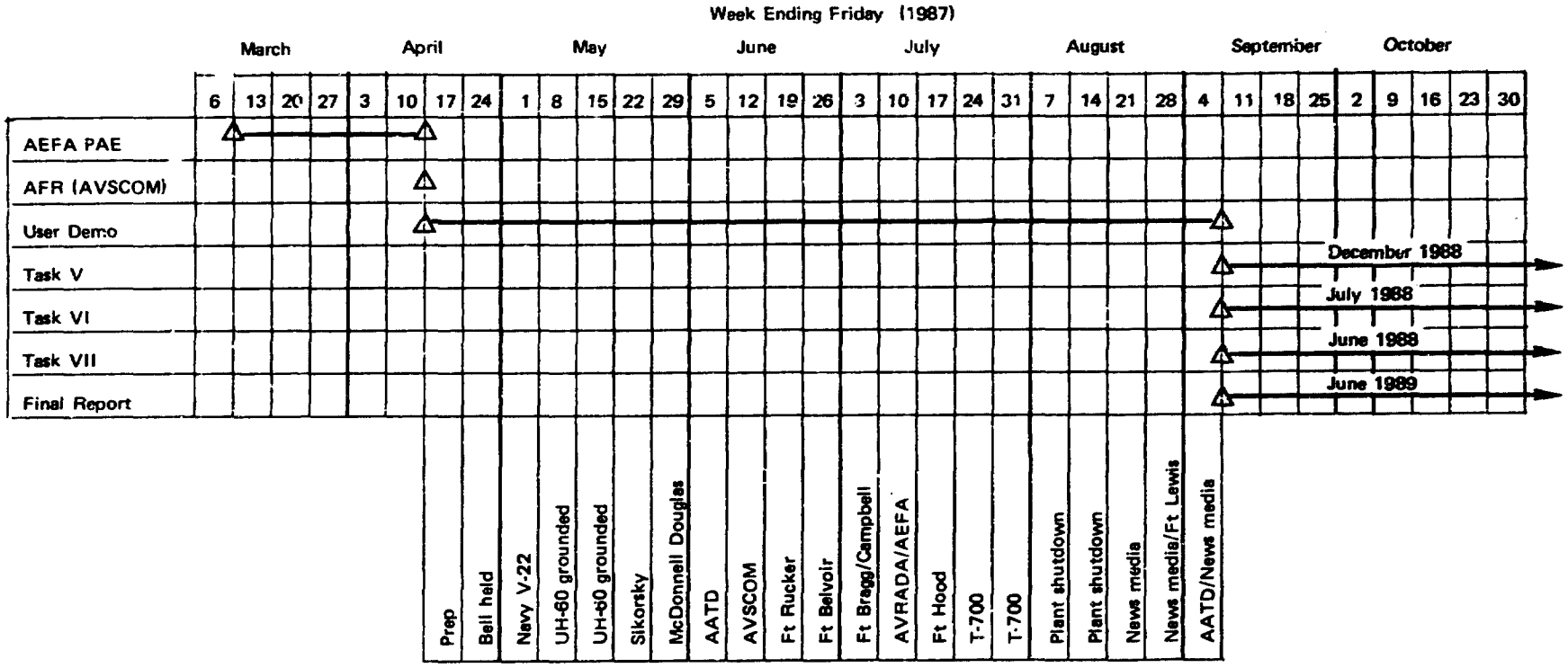

Figure 2. User demonstration program schedule.

ADOCS DESIGN DESCRIPTION

The ADOCS design concept is shown in Figure 3. Pilot's commands from multiaxis sidearm controllers are measured and transmitted via fiber-optic cables to onboard digital flight control processors. The digital processors perform signal shaping and control mixing on the pilot's commands, and optically signal the rotor actuators to respond accordingly. Aircraft sensor information for stability and control augmentation is obtained by the processor from the optical data bus. The system architecture uses separated primary and automatic control paths.

The Primary Flight Control System (PFCS) is analogous to an unaugmented mechanical control system found on current helicopters. It providees a highly reliable direct link between the pilot and the rotor actuators. The ultimate flight-safety reliability of the aircraft is vested in the PFCS, which is designed with two-fail operational reliability. The Automatic Flight Control System (AFCS) provides stability and control augmentation (SCAS) and mission-related "selectable" functions. Mission reliability is vested in the AFCS, which is designed with single-fail operational reliability.

Modifications made to the demonstrator aircraft to accommodate the ADOCS hardware included changes to the right cockpit station to incorporate the DOCS pilot four-axis controller (FAC) the collective pitch controller (CPC), and the pedal force transducer (PFT). The backup control system (BUCS)/Safety pilot occupies the left cockpit station of the JUH-60A. The BUCS/Safety pilot station retains the mechanical control system used in a production UH-60A. The responsibility of the BUCS/Safety pilot is to follow the controls during all ADOCS developmental flying. He initiates a transfer back to the UH-60A mechanical flight control system and takes control of the aircraft when a DOCS slow-over failure is encountered. In addition, the BUCS/Safety pilot accepts command of the aircraft if an automatic transfer is initiated by the DOCS monitor (Figure 4) which senses rapid hard-over failures. The ADOCS demonstrator installation is shown in Figure 5. An in-depth description of the ADOCS design is contained in the preliminary design specification.*

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*Advanced Digital-Optical Control System (ADOCS) Flight Demonstrator Program, Interim Technical Report-Detailed Design, DOC. No. D358-10045-1, Boeing Vertol Company, Philadelphia, Pennsylvania, May 1983.

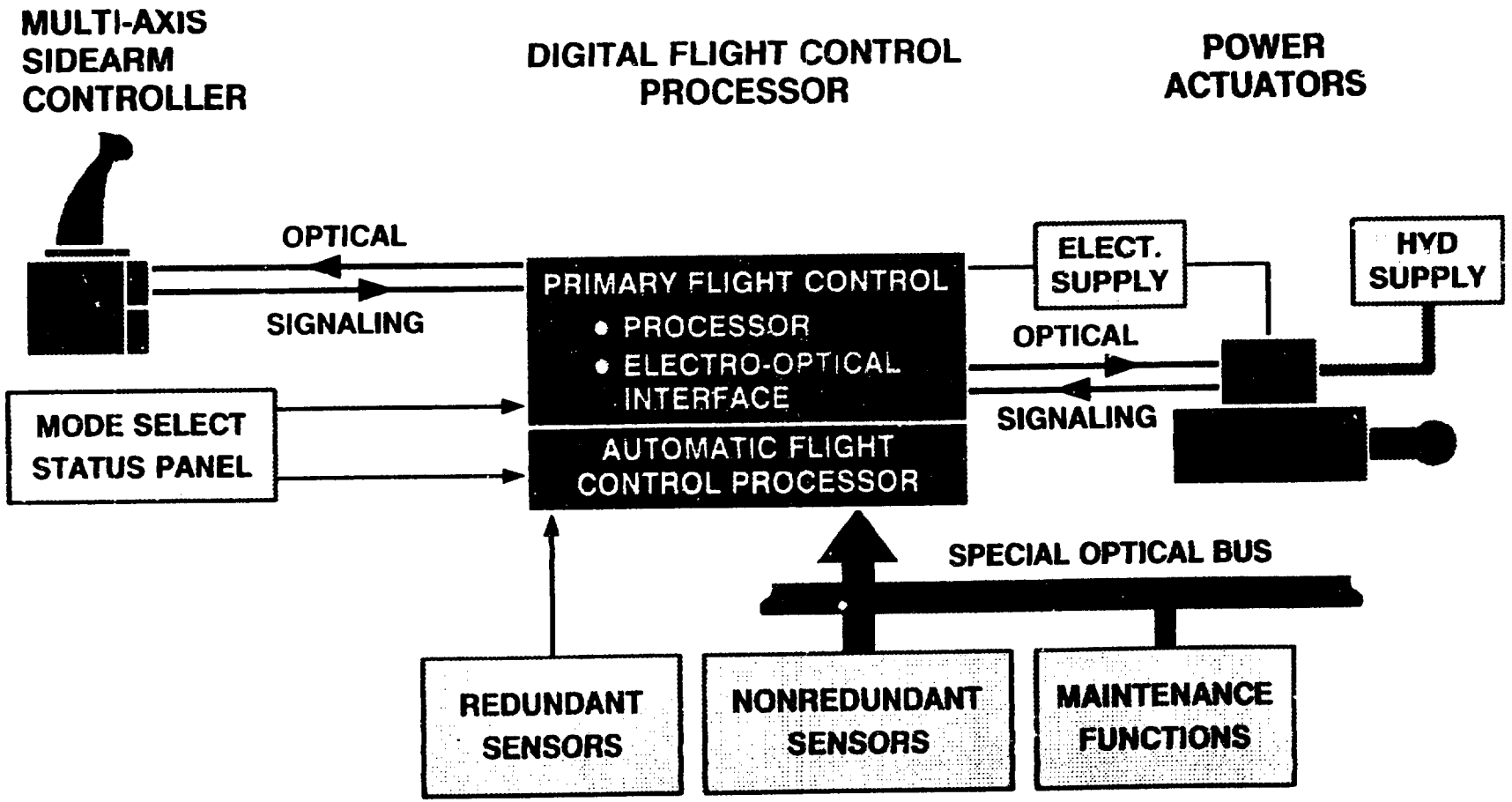


Figure 3. ADOCS design concept.

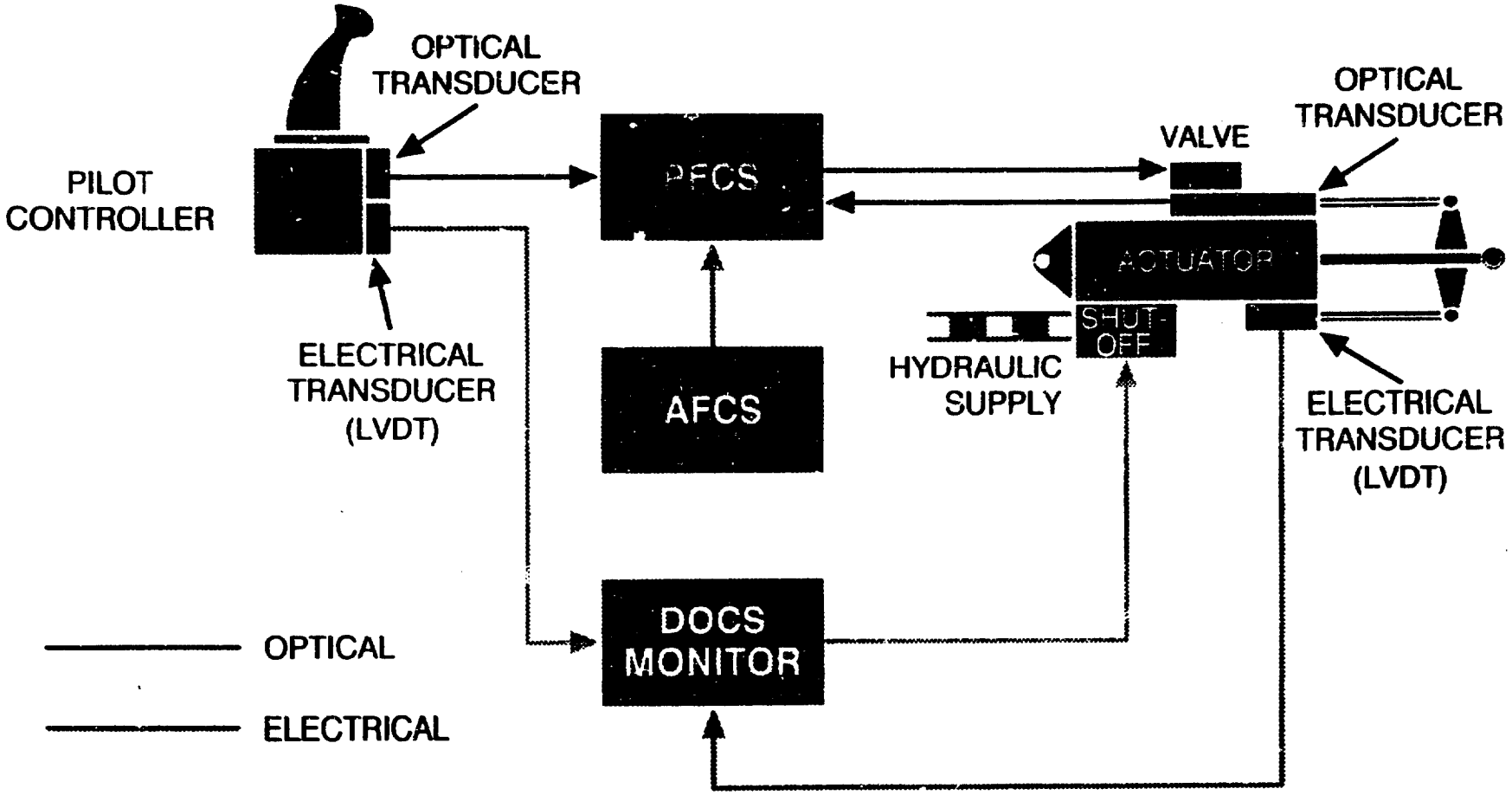
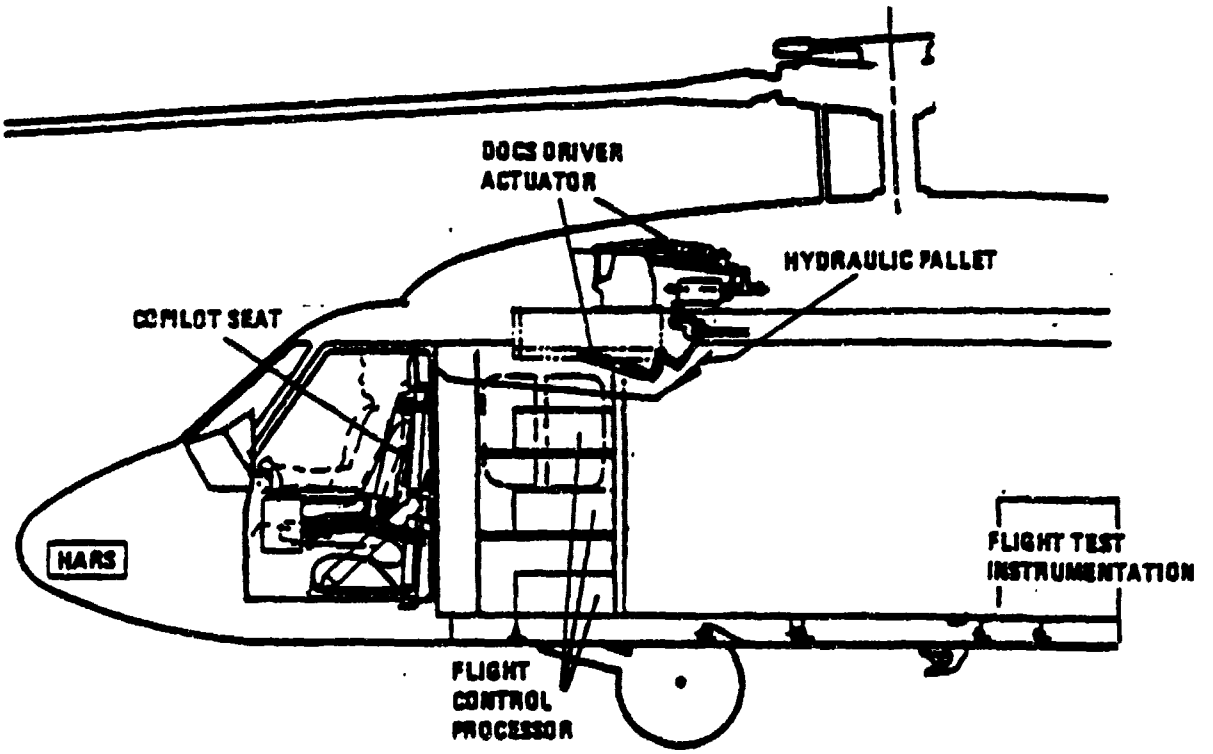
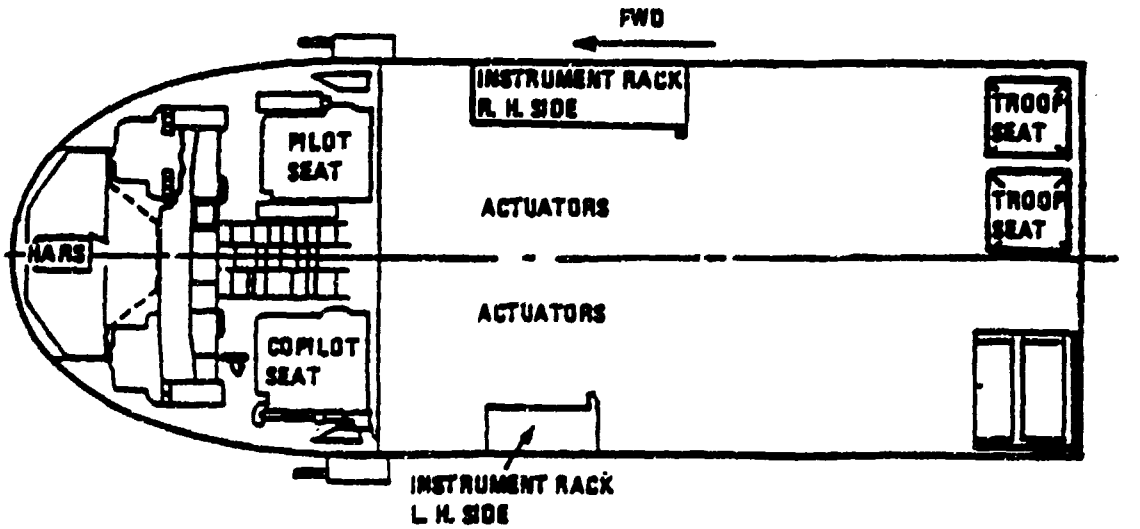


Figure 4. DOCS monitor system.



Demonstrator Inboard Profile



Demonstrator General Floor Layout

Figure 5. Demonstrator installation.

CONDUCT OF PROGRAM

Prior to the first flight for each guest/user pilot, an ADOCS program briefing, systems briefing, and an aircraft operations/safety briefing were presented. A majority of the guest/user pilots flew the aircraft for two 1-hour flights over a two-day period. Some pilots had only enough time for one 1-hour flight. The first flight was structured as a familiarization flight to demonstrate the unique ADOCS features throughout the flight envelope (Table 1). The second flight was structured to demonstrate scout/attack nap of the earth (NOE) mission performance (Table 2). The UDP flight schedule is given in Table 3.

Before the first flight, each pilot filled out a personal history questionnaire as shown in Figure 6. This information was used to establish a background/experience database that could be used during subsequent data analysis to explain any differences in evaluation comments that could be attributed to an experience factor. Pilot's experience ranged from junior officers recently graduated from flight school to senior industry test pilots with over 10,000 flight hours.

Following the last flight, pilots completed a second questionnaire (Figure 7) which provided the outline for their assessment of the ADOCS. Each pilot was asked to compare the ADOCS Automatic Flight Control System (AFCS) and the Primary Flight Control System (PFCS) against the standard UH-60A flight control system, and to make general comments with respect to ride quality, pilot workload, adaptability to sidearm controllers, etc. In all cases, if a pilot was not familiar with a standard system or maneuver with which to compare ADOCS, he was given the opportunity to respond to the question with "cannot judge". One area of the questionnaire requested that the pilots recommend possible changes to improve the ADOCS performance in a future "production-type" system. These recommendations were to be considered for possible incorporation into any follow-on efforts under the ADOCS contract.

The ADOCS JUH-60A Light Hawk was flown by 76 guest/user pilots for a total of 126 flight-hours. The numerical and narrative responses of the pilots are provided in the Appendix. All pilot responses were "digitized" by Boeing and placed in bar-graph form (Figure 8).

NAME: _____ DATE: _____

POSITION/TITLE: _____ PHONE: _____

HOME STATION: _____

TOTAL FLIGHT TIME (APPROX.): _____

ROTARY WING FLIGHT TIME (APPROX.): _____

ROTARY WING EXPERIENCE (LAST 12 MONTHS):

TYPE/MODEL: _____ HOURS: _____

TYPE/MODEL: _____ HOURS: _____

OTHER ROTARY WING AIRCRAFT FLOWN: _____

SIDEARM EXPERIENCE:

TYPE/MODEL: _____ HOURS: _____

TYPE/MODEL: _____ HOURS: _____

NAP-OF-THE-EARTH EXPERIENCE:

TYPE/MODEL: _____ HOURS: _____

TYPE/MODEL: _____ HOURS: _____

SCOUT/ATTACK MISSION EXPERIENCE:

TYPE/MODEL: _____ HOURS: _____

TYPE/MODEL: _____ HOURS: _____

MILITARY EXPERIENCE:

SERVICE: _____ YEARS: _____

PERSONAL DATA:

AGE: _____ HEIGHT: _____ WEIGHT: _____

FLIGHT SUIT SIZE: SMALL _____ MEDIUM _____ LARGE _____

HELMET SIZE: SMALL _____ MEDIUM _____ LARGE _____

GLOVE SIZE: SMALL _____ MEDIUM _____ LARGE _____

HANDEDNESS: RIGHT _____ LEFT _____

ADDITIONAL INFORMATION: _____

Figure 6. ADOCS pilot background questionnaire.

NAME _____

DATE ____ _____

	5 MUCH WORSE	4 WORSE	3 SIMILAR	2 BETTER	1 MUCH BETTER	0 CANNOT JUDGE
ASSESS AFCS PERFORMANCE COMPARED TO						
A) TYPICAL SAS ON HELICOPTER	☐	☐	☐	☐	☐	☐
B) UH-60A SAS ON HELICOPTER	☐	☐	☐	☐	☐	☐
ASSESS PFCS PERFORMANCE COMPARED TO						
A) TYPICAL SAS OFF HELICOPTER	☐	☐	☐	☐	☐	☐
B) UH-60A SAS OFF HELICOPTER	☐	☐	☐	☐	☐	☐

ASSESS AFCS PERFORMANCE	5 UNACCEPTABLE	4 POOR	3 AVERAGE	2 GOOD	1 EXCELLENT	0 CANNOT JUDGE
A) ROLL						
1) STABILITY	☐	☐	☐	☐	☐	☐
2) CONTROL RESPONSE	☐	☐	☐	☐	☐	☐
B) PITCH						
1) STABILITY	☐	☐	☐	☐	☐	☐
2) CONTROL RESPONSE	☐	☐	☐	☐	☐	☐
C) YAW						
1) STABILITY	☐	☐	☐	☐	☐	☐
2) CONTROL RESPONSE	☐	☐	☐	☐	☐	☐
D) VERTICAL						
1) STABILITY	☐	☐	☐	☐	☐	☐
2) CONTROL RESPONSE	☐	☐	☐	☐	☐	☐

Figure 7. ADOCS pilot evaluation questionnaire.

WHAT DID YOU LIKE ABOUT THE SYSTEM:

WHAT DID YOU DISLIKE ABOUT THE SYSTEM:

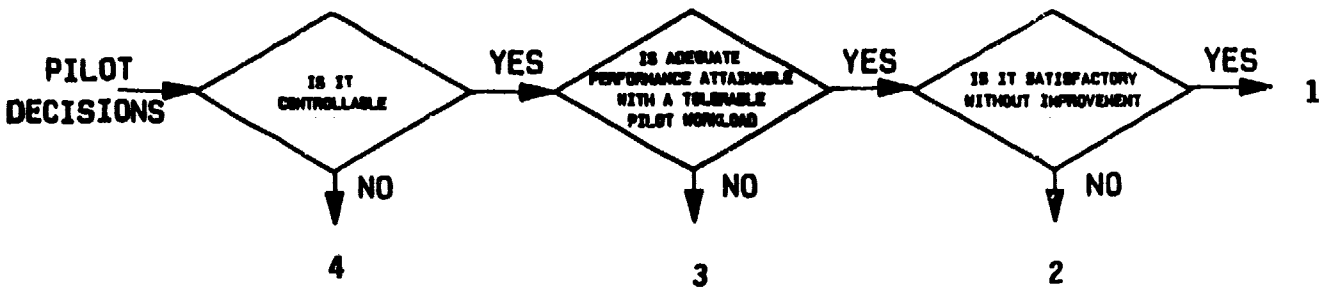
WHAT SYSTEM IMPROVEMENTS WOULD YOU RECOMMEND:

WHAT ADDITIONAL FEATURES WOULD YOU RECOMMEND:

Figure 7. Continued.

HANDLING QUALITIES

ASSESS HANDLING QUALITIES PERFORMANCE



		4	3	2	1	Ø (CANNOT JUDGE)
LANDING/TAKEOFF GROUND OPERATIONS (AFCS CORE & HEADING HOLD)	A). GROUND TAXI	☐	☐	☐	☐	☐
	B). VERTICAL T.O./LANDING	☐	☐	☐	☐	☐
	C). SLOPED T.O./LANDING	☐	☐	☐	☐	☐
	D). RUNNING T.O./LANDING	☐	☐	☐	☐	☐
	E). AIR TAXI	☐	☐	☐	☐	☐
HOVER AND LOW SPEED ((AFCS CORE & HEADING HOLD &	A). PRECISION HOVER (ALL MODES)	☐	☐	☐	☐	☐
	B). LATERAL FLIGHT (VELSTAB & RADAR ALT.)	☐	☐	☐	☐	☐
	C). REARWARD FLIGHT (VELSTAB & RADAR ALT.)	☐	☐	☐	☐	☐
	D). MASK/UNMASK (ALL MODES)	☐	☐	☐	☐	☐
	E). HOVER TURN (ALL MODES)	☐	☐	☐	☐	☐
	F). DASH/QUICK STOP (VELSTAB & RADAR ALT.)	☐	☐	☐	☐	☐
	G). NAP-OF-THE-EARTH (MODES AS REQUIRED)	☐	☐	☐	☐	☐

Figure 7. Continued.

HANDLING QUALITIES

ASSESS HANDLING QUALITIES PERFORMANCE

		4	3	2	1	0 (CANNOT JUDGE)
AFCS						
FORWARD FLIGHT (AFCS CORE & HEADING HOLD &)	A). TRIMMABILITY	☐	☐	☐	☐	☐
	B). TURNS (BARO)	☐	☐	☐	☐	☐
	C). ACCEL./DECEL. (BARO)	☐	☐	☐	☐	☐
	D). PULL UP/PUSH OVER	☐	☐	☐	☐	☐
	E). AIR TO GROUND TARGETING	☐	☐	☐	☐	☐
	F). AUTOROTATION	☐	☐	☐	☐	☐
	G). STRAIGHT APPROACH	☐	☐	☐	☐	☐
	H). TURNING APPROACH	☐	☐	☐	☐	☐
	I). CLIMBS/DESCENTS (BARO)	☐	☐	☐	☐	☐
PFCS						
	A). APPROACH TO HOVER	☐	☐	☐	☐	☐
	B). VERTICAL LANDING	☐	☐	☐	☐	☐

COMMENTS:

_____

_____

_____

_____

_____

Figure 7. Continued.

SELECTABLE MODES

ASSESS VALUE OF SELECTABLE MODES

	NO VALUE 5	LITTLE VALUE 4	SOME VALUE 3	HIGH VALUE 2	VERY HIGH VALUE 1	CANNOT JUDGE 0
A). HEADING HOLD	☐	☐	☐	☐	☐	☐
B). VEL. STAB.	☐	☐	☐	☐	☐	☐
C). HOVER ASSIST	☐	☐	☐	☐	☐	☐
D). RAD. ALT. HOLD	☐	☐	☐	☐	☐	☐
E). BARO. ALT. HOLD	☐	☐	☐	☐	☐	☐

COMMENTS:

_____

_____

_____

_____

Figure 7. Continued.

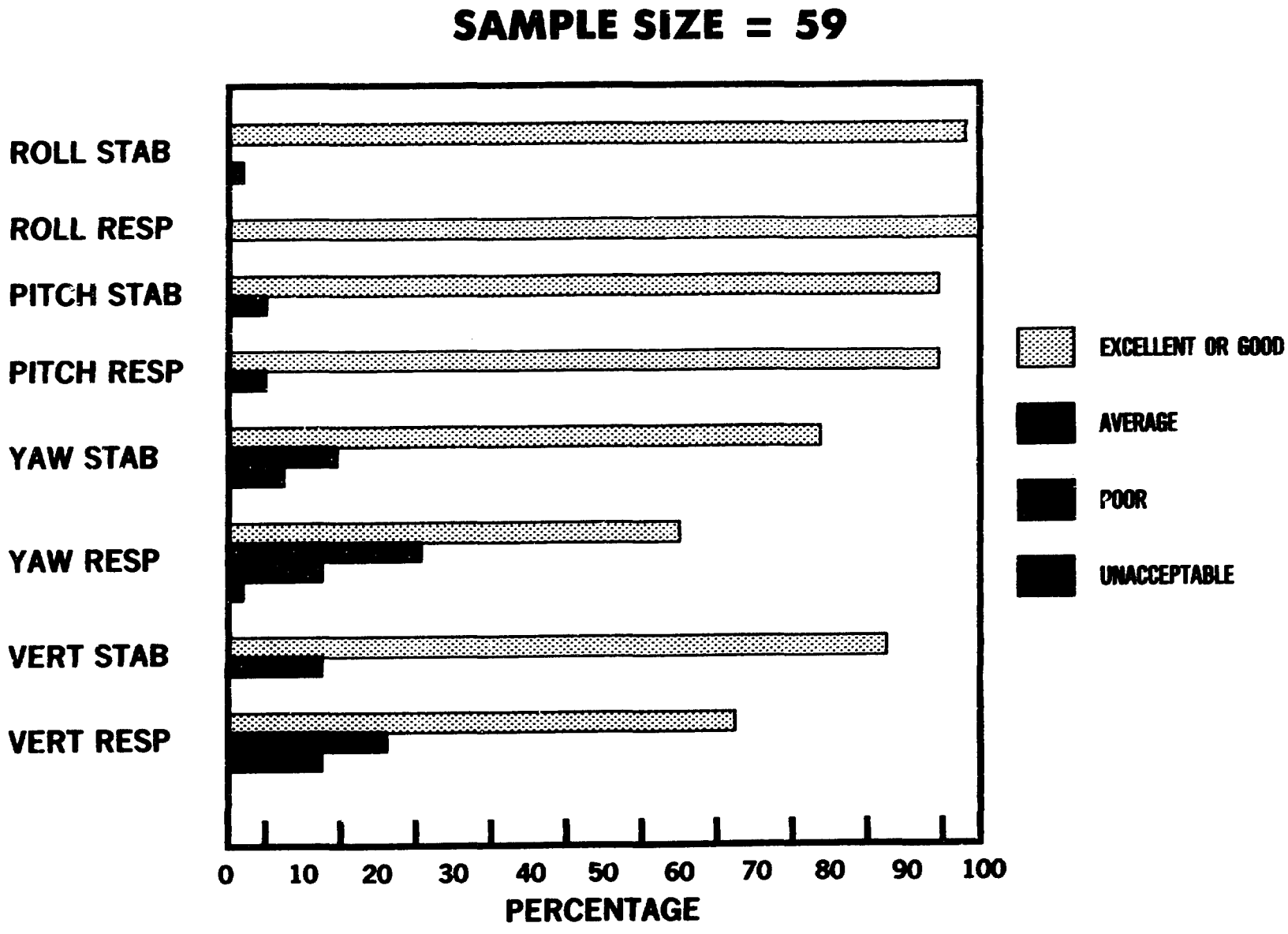


Figure 8. ADOCS pilot response summary.

TABLE 1. DEMONSTRATION FLIGHT 1

Event	Elapsed Time	Army Field Circular 1-212 Task No.	Selectable Modes					
			CORE	HDG HLD	VEL STAB	RAD HOLD	BAR HOLD	HOVER ASSIST
Cruise Flight Engagement (Introduce control axis one at a time)			X	X				
Maneuvering Flight Climbs/Descents Accel/Decel Turns	30 min	1021	X	X			X	
Traffic Pattern		1022,1028	X	X				
Normal Takeoff	40 min	1018	X	X				
Precision Hover (Bring on selectable modes one at a time and repeat pedal turns, sideward & rearward flight)	55 min	1017	X	X	X	X		X
Takeoffs & Landings	1 hr	1032	X	X				
Ground Taxi		1015	X	X				

TABLE 2. DEMONSTRATION FLIGHT 2

Event	Elapsed Time	Army Field Circular 1-212 Task No.	Selectable Modes					
			CORE	HDG HLD	VEL STAB	RAD HOLD	BAR HOLD	HOVER ASSIST
Cruise Flight Engagement (Introduce control axis one at a time)			X	X				
Maneuvering Flight Climbs/Descents Accel/Decel Turns Ground Tracking	20 min	1021	X	X				
NOE Flight (Selectable modes as desired)	30 min	1035, 1037, 1038	X	X				
Instrument Approach	45 min	1081	X	X			X	
Traffic Pattern		1022, 1028	X	X				
Maximum Performance Takeoff	50 min	1019	X	X				
Mask/Unmask (perform several times bringing on selectable modes)	55 min	1090	X	X	X	X		X
Hover OGE		1036	X	X	X	X		X
Takeoffs & Landings	1 hr	1032	X	X				
Ground Taxi		1015	X	X				

TABLE 3. ADOCS USER DEMONSTRATION DAILY SCHEDULE
DATE PREPARED: 9/04/87

	Date	Monday	Tuesday	Wednesday	Thursday	Friday	Date
V22 (Bell)	Apr 20	Maintenance	(R. Balzer)	D. Cannon-BHT T. Warren-BHT D. Cannon-BHT T. Warren-BHT			Apr 24
V22 (Navy)	Apr 27	(R. Macklin) LTC W. Lawrence-USMC	LTC W. Lawrence-USMC	CPT G. Jerauld-AATD	CMDR R. Venorn-USN MAJ J. Hull-USMC CPT M. Granger-USA	MAJ J. Hull-USMC CPT M. Granger-USA	May 1
SOF Message UH-60-87-06	May 4	SOF Message Received	Grounded	Grounded	Grounded	Grounded	May 8
SOF Message UH-60-87-06 and Check Flights	May 11	Grounded	Sikorsky Inspection SOF Cleared	Vibration Check Flight X-203	DOCS Check Flight Flight X-204		May 15
Sikorsky	May 18	Maintenance	N. Lappos-Sikorsky G. Kohler-Sikorsky	N. Lappos-Sikorsky G. Kohler-Sikorsky	L. Stiles-Sikorsky	L. Stiles-Sikorsky	May 22
McDonnell Douglas	May 25	Holiday	Maintenance	J. Hannan-McD C. Parlier-McD	J. Hannan-McD C. Parlier-McD	J. Hannan-McD C. Parlier-McD	May 29
AATD	Jun 1	Maintenance	LTC B. Lippencott J. Benham	MAJ W. Carmona J. Terry	W/X	CPT G. Pry CW3 B. Buoni J. Macrino	Jun 5
AVSCOM/ARTA	Jun 8	Cpt L. Haworth	LTC A. Weand CPT D. Jenkins	LTC T. Almojuela LTC R. Evans	MAJ J. Drabczuk C. Morse-McD	D. Gabin C. Morse-McD	Jun 12
Rucker	Jun 15	Maintenance	CW3 T. Jones 1LT C. Sherrell	1LT C. Sherrell CW3 T. Jones COL F. Mayer	1LT R. Wright MAJ C. Jones	1LT R. Wright MAJ C. Jones	Jun 19
Belvoir	Jun 22	Weather Deploy to Belvoir	J. Burks-NASA COL M. McGuire COL B. Adams BG D. Funk	A/C Maintenance	Stabilator Installation & Rig	MTF CW4 C. Allen MG A. Cianciolo Return to ILG	Jun 26
Bragg/ Campbell	Jun 29	CW4 D. Beishline WO1 C. Kind	CW4 D. Beishline WO1 C. Kind	CW3 R. Heath CW2 J. D'Agostino	CW3 R. Heath CW2 J. D'Agostino	Holiday	Jul 3
AVRADA/AEFA	Jul 6	DAC M. Ehrhart DAC T. Davis	(S. Blushman) CW4 J. Lyle-AEFA	DAC T. Davis CW4 J. Lyle-AEFA	CW4 J. Webre LTC J. Hagen	CW4 J. Webre LTC J. Hagen (J. Lowinger)	Jul 10
Hood	Jul 13	Maintenance	Weather	1LT W. Marchbank CW3 M. Rosas CW4 H. Hutson 1LT B. Barklage	BG(P) R. Andreson 1LT W. Marchbank CW3 M. Rosas	CW4 M. Hutson 1LT B. Barklage	Jul 17
	Jul 20	Maintenance	A/C Maintenance (Engine)	A/C Maintenance (Engine)	A/C Maintenance (Engine)	A/C Maintenance (Engine)	Jul 24
	Jul 27	A/C Maintenance (Engine)	A/C Maintenance (Engine)	A/C Maintenance (Engine)	A/C Maintenance (Engine)	A/C Maintenance (Engine)	Jul 31
	Aug 3	Plant Shutdown	Plant Shutdown	Plant Shutdown	Plant Shutdown	Plant Shutdown	Aug 7

TABLE 3. CONTINUED

	Date	Monday	Tuesday	Wednesday	Thursday	Friday	Date
	Aug 10	Plant Shutdown	Plant Shutdown	Plant Shutdown	Plant Shutdown	Plant Shutdown	Aug 14
Media	Aug 17	A/C Maintenance (Engine)	A/C Maintenance (Engine)	A/C Maintenance (MTF)	D. Nelms (Prof. Pilot)/ (National Def. Mag.) MAJ G. Jerauld- AATD	D. Nelms (Prof. Pilot)/ (National Def. Mag.) (N. Albion)	Aug 21
Media & Lewis	Aug 24	Maintenance (R. Dunn)	D. Green (Rotor & Wing) LCDR Horton (Def. Hel. World) D. Green (Rotor & Wing)	LCDR Horton (Def. Hel. World) (B. Blake)	Weather	CW4 W. Stoneburg WO1 W. Cheek	Aug 28
Media	Aug 31	Maintenance	R. Ropelewski (Avn. Week & Space Tech.) (R. Rayburn)	R. Ropelewski (Avn. Week & Space Tech.) CW4 L. Scott (P. Lasala) (F. Dones)	LTC D. Cahill MAJ T. Kraatz (R. Meuleners) (G. Seehousz)	(J. Davis) (K. Landis) (H. Conover)	Sep 4

CONCLUSIONS

Based on analysis of the guest/user pilot ratings/comments, the following conclusions are offered:

1. The fact that the ADOCS JUH-60A Light Hawk is controlled by a digital fly-by-light control system was transparent to the pilots.

2. The ADOCS force-type sidearm controllers were well received. Adaptation by the pilots was quite rapid.

3. The ADOCS PFCS was as good as a typical unaugmented (SAS OFF) mechanical flight control system.

4. The ADOCS core AFCS provided better response than current operational stability augmentation systems.

5. The ADOCS AFCS provided exceptional aircraft stability (HANDS-OFF hover for 5-10 seconds).

6. Roll stability/response was excellent.

7. Pitch stability/response was good.

8. Yaw stability/response was average.

9. Vertical stability/response was poor.

10. AFCS "Selectable Modes" of Heading Hold, Altitude Hold, Velocity Stabilization, and Hover Assist reduced pilot workload during scout/attack (SCAT) maneuvering.

11. Torque control in the vertical axis was difficult using the force-type (no displacement) sidearm collective due to the absence of a displacement cue that is normally provided by a conventional collective stick.

RECOMMENDATIONS

The following recommendations are offered:

1. Additional developmental flight testing should be conducted to resolve the shortcomings noted by the UDP pilots.

2. A "displacement" collective sidearm controller should be designed, integrated, and flight-tested in an effort to improve vertical axis performance.

3. A UDP should be included as part of all future developmental contracts. The UDP not only transferred the ADOCS technology to the user community but also provided a critical assessment of the ADOCS technology from the unique perspective of pilots who operate in the real-world "field" environment.

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GLOSSARY

AATD	Aviation Applied Technology Directorate
ADOCS	Advanced Digital-Optical Control System
AFCS	Automatic Flight Control System
BUCS	Backup Control System
CPC	Collective Pitch Controller
DOCS	Digital-Optical Control System
FAC	Four-Axis Controller
NOE	Nap-of-the-Earth
PFCS	Primary Flight Control System
PFT	Pedal Force Transducer
SAS	Stability Augmentation System
SCAS	Stability/Control Augmentation System
SCAT	Scout/Attack
UDP	User Demonstration Program

APPENDIX. ADOCS PILOT EVALUATION SUMMARY

ADOCS USER DEMONSTRATION PILOT EVALUATION SUMMARY - INDIVIDUAL RESPONSES

16-Sep-87

F_NAME	L_NAME	TOTAL FLT HRS FIXED WING	TOTAL FLT HRS ROT WING	CLASS	DATE	FLT	BUCS	HRS	AFCS	AFCS 60	PFCS	PFCS 60	RST AB	RRE SP	PST AB	PRE SP	YST AB	YRE SP	VST AB	VRE SP	GND TAX	VRT TO	SLP TO	RUN TO	AIR TAX	PRC NOV	LAT FLT	RER FLT	NSK UNN	NOV TRP	DSN ST	NOE	TRIN	TURN	ACL DEC	PUL PSN	AIR GND	ATO ROT	STR APP	TRN AFP	CLB DES	APP NOV	VRT LND	NDG NLD	VEL STB	NOV ASS	RAD NLD	BAR NLD
RICHARD	BALZER	2,000	14,000	T_PLT	30-Apr-87	189,190	T,B	3.2	1	0	2	0	1	1	1	1	2	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	3	2	1	1
DONNAN A.	CANNON	2,000	9,000	T_PLT	25-Apr-87	191,192,193	T,B,T	2.4	2	0	3	0	0	2	0	2	0	4	0	4	3	3	0	3	2	2	2	2	2	2	3	0	2	1	2	2	2	2	2	3	2	0	0	1	2	2	2	2
T.L.	WARREN	500	7,400	T_PLT	22-Apr-87	191,192,193	T,B,T	2.4	2	0	4	0	4	0	2	0	4	0	3	0	3	4	0	3	1	1	2	1	4	1	3	0	3	1	2	3	0	0	3	4	2	0	0	1	1	1	1	1
WILLIAM S.	LAWRENCE	1,500	2,000	T_PLT	28-Apr-87	195,196	T,B	2.6	3	0	2	0	1	1	3	3	2	3	3	4	2	2	2	2	1	1	1	1	1	1	2	2	1	1	1	1	0	0	1	1	1	1	1	2	3	1	2	3
GARY	JERAULD	0	800	OPRNS	20-Aug-87	197,198,252	T,T,B	2.8	1	0	0	0	1	1	1	1	1	1	2	2	2	1	0	0	1	1	1	1	1	1	1	0	1	2	2	2	2	0	1	1	2	0	0	1	2	1	1	1
ROGER	VERDON	500	1,500	T_PLT	30-Apr-87	199,200	B,T	2.1	1	1	1	1	1	1	1	2	1	3	2	4	2	1	1	0	0	1	1	1	1	2	1	0	1	1	1	1	0	2	1	1	1	1	1	1	3	2	2	2
JEFF	HALL	300	2,400	OPRNS	01-May-87	199,201,202	B,B,T	3.1	3	0	1	0	1	1	1	1	2	4	2	3	2	2	0	2	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1
MATT	GRANGER	100	1,300	OPRNS	01-May-87	200,201,202	T,B,T	2.8	2	2	2	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	1	1	1
NICHOLAS	LAPPOS	500	3,500	T_PLT	19-May-87	205,206	B,T	1.9	3	3	3	3	2	1	3	2	4	4	2	4	3	1	3	2	1	1	1	1	1	2	1	2	1	1	0	0	0	2	1	1	1	2	2	0	0	0	0	0
GARY R.	KOHLER	750	4,500	T_PLT	20-May-87	205,206	B,T	2.1	3	3	4	3	1	2	1	1	2	3	3	3	3	1	2	3	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	3	1	1	1
LORREN	STILES	500	3,500	T_PLT	21-May-87	207,208,209	T,B,B	3.4	1	2	3	2	1	1	1	2	3	3	3	3	2	2	2	2	1	2	1	1	2	2	1	1	2	1	1	3	0	0	2	2	2	2	2	3	1	1	2	3
CAP	PARLIER	*	*	T_PLT	29-May-87	210,211,213	T,B,T	3.8	1	0	3	0	1	1	1	1	2	3	2	3	3	2	2	2	1	2	2	2	1	2	2	2	2	1	1	0	2	2	2	2	2	2	2	2	2	2	2	2
JON E.	HANNAN	*	*	T_PLT	28-May-87	210,212	T,B	2.7	3	0	3	0	1	1	2	3	2	2	2	2	3	2	2	2	1	1	2	2	2	1	3	2	2	1	2	3	3	2	2	2	2	2	2	1	2	1	1	1
BARRY	LIPPENCOTT	900	800	OPRNS	02-Jun-87	215	B	1.1	0	0	0	0	2	2	2	2	2	2	2	2	0	1	0	0	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	2	2	1	1	1
JOHN	HERMAN	1,500	3,000	OPRNS	02-Jun-87	215	B	1.1	2	2	2	2	1	1	1	1	1	1	1	1	2	2	0	0	1	2	2	2	2	2	2	0	2	1	2	0	0	0	2	0	2	2	2	1	2	1	2	2
JOE	TERRY	2,400	800	STAFF	03-Jun-87	216	T	1.0	1	0	0	0	1	2	2	2	1	2	1	2	2	0	0	0	1	2	1	1	1	1	0	0	0	1	1	0	0	0	1	0	1	0	0	1	1	1	1	1
JOHN A.	MACRINO	500	4,500	STAFF	05-Jun-87	217	T	0.8	2	0	1	0	1	2	2	2	1	2	2	2	2	2	0	0	1	2	1	1	2	2	2	2	1	1	2	0	0	0	1	1	2	2	2	2	2	2	1	2
KONI R.	BUCHI	0	4,000	OPRNS	05-Jun-87	218	T	1.0	1	1	0	0	1	1	1	1	2	3	2	3	3	3	0	0	2	1	2	2	2	3	3	0	1	1	2	0	0	0	2	2	2	0	0	1	3	1	3	1
GERALD R.	FRY	0	1,300	OPRNS	05-Jun-87	218	T	1.0	3	0	0	0	1	0	2	0	3	0	2	2	1	1	0	0	1	2	1	1	1	2	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	4	1	1
LOMAN A.	HAWORTH	1,000	4,000	T_PLT	08-Jun-87	219	B	1.4	1	1	3	3	2	2	2	2	2	2	2	2	3	3	0	0	3	2	2	0	1	2	0	0	2	1	2	0	0	3	2	3	2	3	0	1	2	1	1	2
ARNOLD E.	LEMAN	300	2,500	T_PLT	09-Jun-87	220	T	1.0	1	0	0	0	1	1	1	1	1	1	2	1	2	1	0	0	1	2	1	1	1	2	0	0	1	1	1	1	0	0	2	1	2	0	0	1	1	1	1	1
WALLACE D.	JENKINS	0	700	OPRNS	09-Jun-87	220	T	1.0	2	2	0	0	1	1	1	2	1	1	2	3	2	1	0	0	1	1	1	1	1	2	0	0	2	1	1	0	0	0	1	0	1	0	0	1	3	3	2	2
THOMAS N.	ALMQUELA	0	1,500	STAFF	10-Jun-87	221	B	1.0	2	2	2	2	1	2	1	2	2	2	1	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	0	0	1	1	1	0	0	1	3	2	1	1
ROBERT E.	EVANS	9,000	1,300	STAFF	10-Jun-87	221	B	1.0	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0	2	1	2	1	1	1	2	1	2	1	1	2	1	1	0	1	1	1	1	1	1	1	1	1	1
JAN	DRABCZUK	700	1,800	T_PLT	11-Jun-87	222	T	1.0	1	2	0	0	2	1	2	1	4	3	3	3	2	3	0	0	1	1	1	1	2	2	3	0	3	1	2	2	1	2	1	1	2	0	0	1	2	2	2	1
CHAN	NORSE	1,500	3,500	T_PLT	12-Jun-87	222,223	T,B	1.6	1	2	3	2	1	2	1	1	3	3	3	3	0	0	0	0	1	2	1	1	1	2	2	2	1	1	1	0	0	0	1	2	1	2	0	1	1	1	1	1
TERRY L.	JONES	300	3,200	OPRNS	16-Jun-87	224,225	B,B	2.0	0	1	0	3	1	1	1	1	0	0	1	1	1	1	0	2	1	1	1	1	1	1	1	2	2	1	1	0	0	0	1	0	1	0	0	1	1	1	1	1
CHANDLER C	SHERWELL	0	350	OPRNS	17-Jun-87	224,225	B,B	2.0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	2	2	1	1	1	0	1	1	1	1	0	0	1	1	1	2	1
FRANK N.	MAYER	800	3,200	STAFF	17-Jun-87	226	T	1.0	1	1	1	1	2	2	2	2	3	2	2	2	3	2	2	0	3	3	3	3	2	2	2	2	3	3	3	3	0	0	3	0	3	2	2	0	0	0	0	0
CHARLES T.	JONES Jr.	0	2,200	OPRNS	19-Jun-87	227, 228	T,B	2.0	1	2	1	2	1	1	2	2	3	3	2	2	2	1	1	2	2	2	1	1	2	2	2	2	2	1	1	1	2	0	1	0	1	2	0	1	2	2	1	2
ROBERT S.	WRIGHT	0	350	OPRNS	18-Jun-87	227,228	T,B	2.1	0	0	0	0	1	1	1	1	1	2	1	2	2	1	0	0	1	2	1	1	1	2	1	0	1	1	1	1	1	0	1	1	1	1	1	1	2	1	1	3
JOHN S.	BANKS	400	2,300	T_PLT	23-Jun-87	230	B	1.0	3	0	3	0	1	2	2	2	2	4	0	3	3	1	0	1	1	1	1	1	1	3	1	2	3	2	1	0	0	0	1	2	1	1	1	1	2	1	2	2
MATTHEW N.	McGUIRE	200	2,900	STAFF	23-Jun-87	230	B	1.0	1	2	0	0	1	1	1	1	2	2	2	2	0	1	0	0	1	2	1	0	1	2	1	0	1	2	1	0	0	0	0	1	1	0	0	1	2	1	2	1
DAVID	FUNK	500	4,500	STAFF	25-Jun-87	231	T	1.0	2	2	3	3	1	1	1	1	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	2	1	1	1
AUGUSTINE	CIANCIOLO	*	3,000	STAFF	13-Jul-87	232	B	1.0	1	0	0	0	1	1	1	1	1	4	1	1	1	1	0	0	1	1	1	1	1	2	0	0	0	1	0	0	0	0	1	0	1	1	1	1	1	1	1	1
CARL E.	ALLEN	0	3,800	T_PLT	26-Jun-87	232	B	1.3	2	3	2	2	1	1	1	1	1	2	2	2	0	0	0	0	1	1	1	0	1	2	0	0	1	1	1	1	0	0	1	1	1	1	1	2	3	2	0	3
DAVID	BEISHLINE	0	7,000	OPRNS	29-Jun-87	234,235	B,B	2.0	1	3	1	2	1	2	1	2	3	3	1	2	0	2	0	2	1	2	2	1	1	2	1	1	2	1	1	1	1	0	1	1	1	1	2	2	1	1	1	2
CHARLES	KING	0	500	OPRNS	30-Jun-87	234,236	B,B	1.8	0	2	0	3	1	1	1	1	2	2	1	1	1	1	0	1	1	1	1	1	1	2	1	2	1	9	1	1	1	0	1	1	1	1	2	1	2	1	1	2
JAMES R.	D'AGOSTINO	0	640	OPRNS	02-Jul-87	237,238	B,B	1.6	1	1	0	0	1	1	1	1	1	2	1	1	2	1	2	1	1	1	1	1	1	2	1	0	1	1	2	1	0	0	1	0	1	0	0	1	1	1	1	1
R.	HEATH	0	2,700	OPRNS	01-Jul-87	237,238	B,B	1.4	2	2	0	0	1	1	1	1	1	2	1	3	2	1	2	0	1	2	1	1	0	2	1	0	1	1	2	1	0	0	1	1	1	1	1	1	2	3	1	2
MARK	ERHART	300	4,800	STAFF	06-Jul-87	239	T	0.8	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	1	2	1	1	2
TOM	DAVIS	*	5,000	STAFF	06-Jul-87	239,241	T,B	2.0	1	1	1	1	1	1	1	1	1	2	1	1	2	1	0	2	1	1	1	1	1	1	0	1	2	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1

*Unavailable

F_NAME	L_NAME	TOTAL FLT HRS FIXED WING	TOTAL FLT HRS ROT WING	CLASS	DATE	FLT	BUCS	HRS
JOE	LYLE	1,000	4,000	T_PLT	07-Jul-87	240,241	B,B	1.8
JAMES L.	WEBRE	2,600	1,800	T_PLT	09-Jul-87	242,243	T,B	2.1
JOHN	HAGEN	500	2,000	T_PLT	09-Jul-87	242,243	T,B	2.1
WILLIAM J.	HARCHENAK	0	375	OPNS	15-Jul-87	245,249	B,B	2.1
MANUAL P.	ROSAS	0	1,000	OPNS	15-Jul-87	245,249	B,B	1.9
MICHAEL J.	HUTSON	0	6,500	OPNS	15-Jul-87	246,250	T,T	2.0
BRIAN J.	BARCLAGE	0	300	OPNS	15-Jul-87	246,250	T,T	2.0
RONALD K.	ANDERSON	1,200	1,700	STAFF	16-Jul-87	248	T	1.5
DOUGLAS W.	MELMS	500	2,500	PRESS	21-Aug-87	252,253	B,B	2.2
RAY	DUNN	1,250	4,500	T_PLT	24-Aug-87	254	T	1.0
R.I.	NORTON	200	2,300	T_PLT	26-Aug-87	255,257	B,B	2.1
BRUCE	BLAKE	*	*	T_PLT	26-Aug-87	257	B	1.1
WALLACE N.	SKVEBURG	3,000	6,400	OPNS	28-Aug-87	258	B	1.2
WILLIAM A.	CHEEK	100	500	OPNS	28-Aug-87	258	B	1.0
ROBERT L.	RAYBURN	1,300	0	NORM	01-Sep-87	259	B	1.2
LES	SCOTT	1,500	6,000	T_PLT	02-Sep-87	260	T	1.0
TIMOTHY A.	KRAATZ	100	1,100	STAFF	05-Sep-87	262	B	1.0
DOUGLAS A.	CAHILL	300	3,200	STAFF	05-Sep-87	262	B	1.0

L_NAME	AFCS	AFCS 60	PFCS	PFCS 60	RSTAB	RRESP	PSTAB	PRESP	YSTAB	YRESP	VSTAB	VRESP	GND TAX	VRT TO	SLP TO	RUN TO	AIR TAX	PRC NOV	LAT FLT	REM FLT
LYLE	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	1	1	1	1
WEBRE	3	3	0	0	2	2	2	2	2	4	2	4	3	2	2	2	2	1	2	2
HAGEN	2	2	3	3	1	1	2	2	2	3	2	2	2	2	2	2	1	1	1	1
HARCHENAK	0	2	0	1	1	2	2	2	3	3	2	2	2	2	0	0	1	2	1	1
ROSAS	0	1	0	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1
HUTSON	0	1	0	0	1	1	1	2	1	0	1	2	2	1	1	1	1	1	1	1
BARCLAGE	0	1	0	1	1	1	1	1	2	2	1	1	1	3	0	0	2	1	1	1
ANDERSON	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
MELMS	1	0	2	0	1	1	1	1	1	1	1	1	3	2	0	0	1	1	1	1
DUNN	2	2	4	0	2	2	2	2	2	4	3	4	0	2	0	0	2	0	1	1
NORTON	2	2	2	2	2	1	2	3	3	5	2	3	3	2	0	2	2	1	2	0
BLAKE	0	0	0	0	1	1	2	2	2	3	3	4	0	3	0	0	1	1	1	1
SKVEBURG	2	3	0	0	1	1	1	1	2	1	1	1	1	1	0	0	1	2	1	1
CHEEK	0	2	0	0	1	1	1	1	1	2	2	4	2	1	0	3	1	2	1	1
RAYBURN	0	0	0	0	2	1	3	2	2	2	2	3	2	2	0	0	1	1	2	0
SCOTT	1	2	3	3	1	1	1	2	2	3	1	2	0	0	0	0	1	1	1	1
KRAATZ	2	2	1	1	1	1	1	1	2	1	1	2	1	0	0	1	1	1	1	1
CAHILL	1	1	1	1	1	1	1	1	4	2	1	1	0	2	0	0	1	2	1	1

L_NAME	NSK UN	HOV TRN	DSN STP	MOE	TRIN	TURN	ACL DEC	PUL PSN	AIR GND	ATC ROT	STR APP	TRN APP	CLB DES	APP NOV	VRT LND	NDG NLD	VEL STS	NOV ASS	RAD NLD	BAR NLD
LYLE	1	1	0	2	1	1	0	2	3	2	1	1	1	2	0	3	2	1	1	1
WEBRE	1	2	0	2	0	2	2	0	0	0	1	1	2	0	0	1	4	1	1	1
HAGEN	1	2	0	0	1	1	1	0	0	0	1	0	2	0	0	2	2	2	2	2
HARCHENAK	1	1	1	2	2	1	2	2	0	0	2	2	1	1	2	1	1	1	1	1
ROSAS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2
HUTSON	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1
BARCLAGE	2	2	1	2	1	1	1	1	2	0	1	1	1	1	2	1	3	1	1	1
ANDERSON	2	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1
MELMS	2	2	1	2	2	1	2	0	2	0	1	0	3	2	2	1	2	2	2	2
DUNN	2	2	0	0	2	1	2	2	0	3	1	0	1	0	0	2	2	2	2	2
NORTON	1	2	0	1	1	1	1	2	0	0	1	0	1	2	0	1	2	3	2	2
BLAKE	1	1	0	0	1	1	2	2	0	0	1	0	1	0	0	2	2	2	2	2
SKVEBURG	2	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	3	1	1	2
CHEEK	1	1	0	0	0	1	0	2	0	0	2	2	1	1	1	1	1	0	1	1
RAYBURN	1	1	2	0	2	2	2	2	0	1	2	0	1	0	0	1	3	1	1	2
SCOTT	1	2	0	0	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1
KRAATZ	1	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	2
CAHILL	1	2	1	0	2	2	1	0	0	0	1	1	1	1	0	2	1	1	1	1

*Unavailable

ADOCS USER DEMONSTRATION
PILOT EVALUATION COMMENTS

FIRST NAME	LAST NAME	LIKES	DISLIKES	IMPROVEMENTS	ADDED FEATURES	HQ COMMENTS	MODES COMMENTS
RICHARD	BALZER	LONG/LAT CONTROL EXCELLENT. SOME DIFFICULTY WITH TURN COORDINATION AT LOW SPEED. PREFER SIDE STICK FORCE CONTROL FOR UP AND AWAY PRIMARILY FOR TRIMMABILITY.	THRUST CONTROL INTEGRATION WITHOUT SUFFICIENT CUE.	LOW SPEED TURN COORDINATION, DISPLACEMENT THRUST CONTROL - SHORT TRAVEL 4"	WOULD LIKE TO SEE MULTIPLE SWITCHES EVALUATED ON FORCE CONTROLLER TO DETERMINE IF SWITCH OPERATED CONTROL INPUTS IS A PROBLEM. FROM THIS EVALUATION, THE DEVELOPMENT OF A DESIGN CRITERIA FOR FORCE CONTROLLER SWITCHES.		
DONNAN A.	CANNON	PILOT "OUT OF THE LOOP" SYSTEM WORKED VERY WELL.	FORCE CONTROLLERS - NO TACTILE FEEDBACK (RESULTANT OUTPUT FROM A CALCULATED INPUT. 3+1 IS MUCH LESS PREFERED vs 2+1+1 CONTROL SYSTEM (DISPLACEMENT).	1. APPLY ADOCS CONCEPT TO A DISPLACEMENT SYSTEM ON THE A/C OF YOUR CHOICE (NOTHING MAGIC ABOUT THE UH-60). 2. INCORPORATE A 2+1+1 SIMULTANEOUSLY. 3. DEVELOP SYSTEM SO AS TO UTILIZE THE WHOLE FLIGHT ENVELOPE TO INCLUDE TOUCHDOWN AUTOROTATIONS AND USUAL STRUCTURAL TYPE CONTROL APPLICATIONS.	OPTIMIZE THE TURN COORDINATION FEATURE SO THAT THE A/C WILL RETURN "BALL CENTERED" AFTER PILOT HAS DISPLACED A/C OTHERWISE (ABOVE SOME PREDETERMINED LOW AIRSPEED).	IN TURNING MANEUVERS RATING GIVEN ARE DUE TO YAW REQUIREMENTS - WHICH WERE USUALLY LATE & TOO LARGE AN INPUT, RESULTS IN ROUGH AND ABRUPT A/C RESPONSE.	OVER GRASS/NATURAL TERRAIN RADALT HOLD SHOULD BE OPTIMIZED.
T.L.	WARREN	BANK ANGLE HOLD, HOLD FUNCTIONS	CONTROLLER CONFIGURATION 3+1, FORCE CONTROLLERS - HIGH FORCES AND NOT ENOUGH DISPLACEMENT, ATTITUDE CONTROL LAWS.	RATE COMMAND ATTITUDE HOLD, DISPLACEMENT CONTROLLERS IN ALL AXES +/- 2" (CYCLIC), AUTOMATIC INCORPORATION OF ALL HOLD FUNCTIONS, DISPLACEMENT COLLECTIVE WITH MINIMUM 4" DISPLACEMENT.	START OVER AND INCORPORATE THE ABOVE RECOMMENDATIONS. TECHNOLOGY SHOULD BE USED TO MAKE AN AIRCRAFT EASIER TO FLY - NOT USED AS A WAY TO INCORPORATE TECHNOLOGY.	BANK & HOLD EXCELLENT, PEDAL COORDINATION TO HEADING HOLD SHOULD HAVE BEEN CARRIED TO LOWER A/S THAN 50 KTS.	WITHOUT SELECTABLE MODES THERE IS NO REAL PILOT VALUE TO A FLY BY LIGHT SYSTEM. SELECTABLE MODES NOT QUITE AS IMPORTANT FOR UTILITY MISSONS. MAKING A HELICOPTER FLY BETTER THAN A PUSH-PULL TUBE CONTROL SYSTEM IS THE PILOT VALUE OF ELECTRONIC FLIGHT CONTROLS.
WILLIAM S.	LAWRENCE	"TASK EASERS" ALT HOLD (WORKS MUCH BETTER THAN MOST). HEADING HOLD & VELSTAB MAKE LOW SPEED TASKS EASIER. BANK ANGLE MAINTENANCE & A/S HOLD IN UP AND AWAY FLIGHT NICE.	FORCE COLLECTIVE - UNPREDICTABLE, LEADS TO UNWANTED AND/OR INCORRECT MAGNITUDE OF INPUTS. DID NOT LIKE DIRECTIONAL SENSITIVITY PRIMARILY TO A LESSER EXTENT. PITCH AND ROLL LEADS TO DIFFICULTY IN AGGRESSIVE OR HIGH GAIN TASKS.	DISPLACEMENT COLLECTIVE, LESS SENSITIVE DIRECTIONAL AXIS.	BETTER MORE PREDICTABLE CUE INDICATING SYSTEM.	MY FEELING IS THAT TASKS THAT CAN TAKE ADVANTAGE OR ASSIST FUNCTIONS ARE "A"; THOSE WHICH ARE SUBJECT TO CRITICAL SENSITIVITIES ARE ALL "D" - FAIRLY BASIC.	
ROGER	VENORN	LIKE ROLL & PITCH RESPONSIVENESS, HEADING HOLD, ALT. HOLD, HOVER ASSIST, TURN COORDINATION, AIRSPEED REFERENCE SYSTEM, HOVER STABILITY.	DON'T LIKE THRUST LEVER CONTROL IMPLEMENTATION, NUISANCE TRIPS, POOR TORQUE DISPLAY & TRIM FOLLOW UP INTERACTION, INADVERTENT YAW ACTIVATION IN TURNS.	RECOMMEND HIGHER YAW BREAKOUT FORCE AND DISPLACEMENT THRUST CONTROL.			
GARY R.	KOHLER	HANDLING QUALITIES IN GENERAL ARE GOOD. HOVER ASSIST MODE VERY WELL DONE. ALT HOLD MODES ARE GOOD	DID NOT LIKE DOCS MONITOR CUT-OFFS. TURN COORDINATION COULD BE TIGHTER. SIDEARM STICK TOO SMALL. DIFFICULT	WOULD RECOMMEND YAW CHANNELS GRADIANTS + DAMPING. COLLECTIVE POSITION FURTHER AFT AND EITHER LESS	STABILATOR INCLUDED IN SYSTEM.		

ADOCS USER DEMONSTRATION
PILOT EVALUATION COMMENTS

FIRST NAME	LAST NAME	LIKES	DISLIKES	IMPROVEMENTS	ADDED FEATURES	NO COMMENTS	MODES COMMENTS
			TO CONTROL HEADING DURING RUNNING LANDINGS.	COMPLIANCE IN A FORCE STICK OR A SLIDER. IMPROVE GUST RESPONSE - NOW NO BETTER THAN REGULAR UH-60.			
NICHOLAS	LAPPOS	SEE ATTACHMENT TO QUESTIONNAIRE.	SEE ATTACHMENT TO QUESTIONNAIRE.	SEE ATTACHMENT TO QUESTIONNAIRE.	SEE ATTACHMENT TO QUESTIONNAIRE.	FLY HOME VFR - PFCS WOULD BE LEVEL 1.	
MATT	GRANGER	ROLL RESPONSIVENESS AND STABILITY WAS EXCELLENT. HANDS-OFF ABILITIES BOTH IN FLIGHT AND DURING HOVER WITH HOVER HOLD ENGAGED WERE EXCEPTIONAL. REDUCED PILOT FLIGHT CONTROL WORKLOAD WOULD HAVE SUFFICIENT TACTICAL ADVANTAGES IN ALLOWING PILOT CONCENTRATION TO BE DEVOTED TO MISSION TASKS.	THE FORCE RATE COLLECTIVE CONTROL REQUIRED CONSTANT REFERENCE IN FLIGHT TO TORQUE /VSI INSTRUMENTS FOR FEEDBACK CUES. VISUAL CUES DURING HOVERING FLIGHT MADE THE SYSTEM MORE TOLLERABLE IN THESE FLIGHT MODES. HOWEVER I FEEL A DISPLACEMENT TYPE COLLECTIVE CONTROL WOULD STILL BE A BETTER OVERALL CHOICE.	MAKE THE COLLECTIVE A DISPLACEMENT TYPE CONTROL. REDUCE SENSITIVITY OF THE YAW CONTROL. INITIAL BREAKOUT FORCE IS TOO LARGE IN COMPARISON TO THE GAIN FOR YAW RATE CONTROL. BREAK-OUT FORCE IS PROBABLY ABOUT RIGHT TO PREVENT INADVERTANT YAW INPUTS DURING ROLL COMMANDS. ANSWER IS TO ADJUST THE GAIN CURVE FOR YAW INPUTS.	FOR A PRODUCTION SYSTEM I WOULD RECOMMEND MOVING THE AFCS ENGAGE FEATURE TO A PANEL NEAR / AS PART OF THE SIDEARM CONTROLLER.		
JEFF	NULL	LIKED POSITION COMFORT, RESPONSIVENESS (PITCH & ROLL), EASE OF ADAPTING FROM CONVENTIONAL HELICOPTER CONTROLS.	TOO SENSITIVE IN YAW. RATE COLLECTIVE DIFFICULT TO JUDGE POWER INPUTS/SETTINGS.	WOULD RECOMMEND DECREASED YAW SENSITIVITY, DISPLACEMENT COLLECTIVE.	SHEEPSKIN SEATS!	ALL TASKS RATED "B" WOULD HAVE PROBABLY BEEN "A" IF YAW CONTROL WAS LESS SENSITIVE. OCCASIONAL DIFFICULTY WITH FINAL POWER REDUCTION AFTER TAIL WHEEL TOUCHDOWN. TENDING TO FLY IT AS DISPLACEMENT CONTROL RATHER THAN FORCE CONTROL. I THINK I WOULD HAVE BEEN MORE SUCCESSFUL IF IT HAD BEEN DISPLACEMENT CONTROL.	SELECTABLE MODES GREATLY REDUCE PILOT WORKLOADS AND ARE APPICABLE TO MANY FLIGHT TASKS (HIGH HOVER WORKLOAD, DIST. FLIGHT, ECT.)
LORREN	STILES	GOOD JOB WITH AFCS. LIKE ADVANCED MODES. LIKE PFCS/AFCS CONCEPT. THE SYSTEM IS CONFIGURED VERY WELL FOR ADDITIONAL ADVANCED FLIGHT CONTROL STUDIES. ALOT OF QUESTIONS STILL NEED TO BE ANSWERED.	DID NOT LIKE FORCE COLLECTIVE, LACK OF HIGH FIDELITY YAW FEEDBACK (COORDINATED TURN IN FLIGHT), GRIP SHAPE AND SIZE.	INVESTIGATE: SUITABILITY OF AIRSPEED HOLD vs ATTITUDE HOLD, ATTITUDE vs RATE COMMAND IN PITCH, NEED FOR POSITIVE MANEUVER STABILITY, HEAD-UP SYMBOLOGY FOR SCOUT/ATTACK MISSION / ADDED TRACKING TASKS, METHOD OF COLLECTING PILOT PERFORMANCE DATA OVER MEASURED COURSE (X,Y,Z ACCURACY), GIVEN 4+ NVG OR FLIR AIRCRAFT SHOULD BE EVALUATED AT NIGHT, DISPLACEMENT COLLECTIVE, MORE PFCS.			
CAP	PAPLIER	SMOOTH INPUT/RESPONSE EXCEPT YAW. LOW WORKLOAD.	DIDN'T LIKE DROPOUTS, WHEEL WALK ON LANDING, LACK OF PRECISE FLIGHT STATUS DATA.	ELIMINATE DROPOUTS & PFCS REVERSIONS, IMPROVE AIR TO GROUND TRANSITION, GROUND	NUD FOR FLIGHT SYMBOLOGY, BETTER DEFINITION OF THE OPERATING MODES PREFERABLY		

ADOCS USER DEMONSTRATION
PILOT EVALUATION COMMENTS

FIRST NAME	LAST NAME	LIKES	DISLIKES	IMPROVEMENTS	ADDED FEATURES	NO COMMENTS	MODES COMMENTS
				HANDLING, INCORPORATE BETTER POWER MANAGEMENT/Nr CONTROL, ENABLE INITIATION OF RADALT-VELSTAB & HOVER TO ASSIST PRECISION LANDING (SLOPED), IMPROVE ALTITUDE REFERENCE ALGORITHM.	AN EYES OUT CAPABILITY TO KNOW THE MODE, REEALUATE 4+0 CONFIGURATION.		
JON E.	HANNAN	THE ABILITY TO GET THE SYSTEM TO DO WHAT YOU WANT, WHEN YOU WANT IT - WITH LOW PILOT WORKLOAD. EASE OF TAKEOFF. HOVER PERFORMANCE WITH HEADING & ALT. HOLD OR HOVER ASSIST. (ie. HANDS OFF PRECISION HOVER.)	COMPLEXITY OF SYSTEM - SHOULD BE MORE AUTOMATIC, TRIPS OF SYSTEM DUE TO HIGH RATES AN/OR NUISANCE, THE GROUND CONTROL LAWS PERFORMANCE, COLLECTIVE INTGRATION FWD/AFT vs UP/DOWN, HIGH WORK LOADS DURING LANDINGS(SLOPED).	REDUCE THE COMPLEXITY OF SYSTEM, MANUAL MODES, SYSTEM DROPOUTS. IMPROVE YAW PERFORMANCE AND TURN COORDINATION, TO MATCH ROLL PERFORMANCE. INCORPORATE TORQUE LIMITING BY SYSTEM AND IMPROVED POWER MANAGEMENT. ADD HELMET DISPLAY TO KEEP HEAD OUT OF COCKPIT. IMPROVE GROUND CONTROL LAWS & HIGHER AUGMENTATION FOR THE LANDING TRANSITIONS. ROTATE COLLECTIVE TO MORE VERTICAL UP AND DOWN ACTUATION.	COUPLED INSTRUMENT APPROACH AND NAV FEATURES, AUTO ALTITUDE HOLD REFERENCING SYSTEM (RAD & BARO, EVALUATE A FOUR-AXIS CONTROLLER vs. 3+1 ON THIS A/C.	VERY GOOD BRIEFING ON FIRST DAY AND APPRECIATED THE INFORMAL AND OPEN DISCUSSIONS FOLLOWING EACH FLIGHT. KEEP UP THE GOOD WORK. OVERALL THIS COMPANY HAS DONE A FANTASTIC JOB ON THIS SYSTEM AND MORE WORK NEEDS TO BE DONE AND ALOT OF PR AND DEMONSTRATION HAS TO BE DONE. GOOD LUCK.	AS ANY QUESTIONNAIRE THESE ARE JUST OVERALL COMMENTS AND CAN GO ONE BLOCK EITHER WAY DEPENDING ON THE CONSTRAINTS OF THE EVALUATIONS.
BARRY	LIPPINCOTT	CONTROL RESPONSE WAS MUCH BETTER THAN I ANTICIPATED. THE ROLL AXIS + PITCH AXIS IMPRESSED ME. THE YAW AXIS WAS EASIER TO CONTROL THAN I EXPECTED.	DURING DESCENT, THE PRESSURE TO HOLD THE COLLECTIVE DOWN WAS BOTHERSOME.	POSSIBLY A RELEASE/SET BUTTON SIMILAR TO FORCE TRIM ON A UH-1, TO ASSIST IN HOLDING FORWARD PRESSURE ON COLLECTIVE DURING DESCENT.		LANDINGS WERE DONE SEVERAL TIMES PER ATTEMPT, BUT WITH LITTLE TIME FOR NON-UH60 PILOTS IT CAN BE OVERCOME.	THE SIDEARM CONTROLLERS WERE EASIER TO ADAPT TO THAN I FELT THEY WOULD. I WAS SURPRIZED AT HOW EASY IT WAS TO CONTROL THE A/C IN ALL FLIGHT ATITUDES WITH THE SIDEARM CONTROLLERS. THE TRANSITION WAS RELATIVELY SIMPLE. NEED TO TRY TO GET A VOT WHO'S GROWN UP WITH VIDEO GAMES TO FLY THE A/C FOR A COUPLE HOURS TO SEE HOW ADAPTABLE HE IS TO THE SYSTEM AND WHAT HIS LEARNING CURVE IS. ALL OF THE SELECTABLE MODES ARE NICE TO HAVE. THE HEADING HOLD, RAD ALT & BARO ALT WOULD BE THE ONES I PRIMARILY WOULD LIKE. VEL STAB & HOVER ASSIST ARE NICE TO HAVE ITEMS.
JOHN	BEHMAN	THE CURRENT SIDEARM ARRANGEMENT WAS VERY COMFORTABLE AND EASY TO GET USE TO. I FEEL THAN AS EXPERIENCED WAS GAINED CONTROL TOUCH WOULD INCREASE SIGNIFICANTLY.	DID NOT LIKE THE PRESSURES WHEN INCREASING/DECREASING COLLECTIVE WHILE ON BARO HOLD, THE DIVERGENCY WHEN DOING ROLLING MOVES L&R WITH ONLY PFCS ON. ALL THOUGH CONTROLABLE IT WOULD INCREASE PILOT WORKLOAD CONSIDERABLY DURING MANEUVERING FLIGHT. DID NOT LIKE THE AMOUNT OF YAW THAT HAD TO BE HELD IN DURING GROUND TAXING - COULD	SOME SORT OF FEEDBACK IN COLLECTIVE TO GIVE BETTER JUDGEMENT DURING HEADS UP MANEUVERING.	UPGRADING DOPPLER & GIVE BETTER HOVER ASSIST (MINIMIZE DRIFT).		

ADOCS USER DEMONSTRATION
PILOT EVALUATION COMMENTS

FIRST NAME	LAST NAME	LIKES	DISLIKES	IMPROVEMENTS	ADDED FEATURES	NO COMMENTS	MODES COMMENTS
			PROVE VERY TIRING.				
JOE	TERRY	ALL SELECTABLE MODES WORKED WELL AS ADVERTISED EXCEPT DIDN'T GET TO TRY BARO ALT HOLD. BANK ANGLE HOLD WITH TURN COORDINATION EXCELLENT.	NO STRONG DISLIKES. YAW SENSITIVITY COULD BE LESS FOR FIRST TIME PILOTS BUT NOT REALLY BAD.	OTHER THAN KNOWN DIFFICIENCIES, HEADING HOLD, TURN RATE OR SOME OTHER CONTROL LAWS SHOULD BE DEVELOPED TO EASE GROUND TAXI.			
GERALD R.	PRY	VERY MUCH LIKED THE ROLL AXIS CONTROLLABILITY AND STABILITY, THE AIRSPEED & HEADING HOLD. ALL OF THESE AREAS FELT NATURAL AND IT WAS EASY TO APPRECIATE THE DECREASED WORKLOAD.	THE YAW AND LONGITUDINAL PITCH INPUTS REQUIRED SOME CONCENTRATION BECAUSE I FOUND MYSELF FIGHTING THE SYSTEM.	A PROPORTIONAL GRADIENT IN THE VERTICAL/POWER AXIS WOULD HELP WITH FEEL. I PULLED IN OR TOOK OUT MORE POWER THAN WAS REQUIRED UNTIL I CONCENTRATED ON FINGER TIP PRESSURE.			HOVER ASSIST WAS OF SOME VALUE BUT THE SLOW DRIFT TO THE RIGHT WOULD REQUIRE CONSTANT VIGILANCE DEFEATING THE PRIMARY ADVANTAGE OF HAVING IT.
BONI M.	BUONI	REDUCTION OF PILOT WORKLOAD WITH ALL SYSTEMS OPERATIONAL.	YAW FORCE CONTROLLER ENGAGE & DISENGAGE BETWEEN AFCS & PILOT INPUT. WHEN ALT HOLD IS DISENGAGED AND AIRSPEED IS INCREASED.	COLLECTIVE INPUT/FORCE CONTROL SHOULD BE COUPLED TO A HEADS-UP DISPLAY SO THAT YOU DO NOT HAVE TO LOOK BACK IN THE COCKPIT FOR INDICATION.	MODIFY RIGHT ARMREST TO ALLOW IT TO ADJUST YOUR ARM AND HAND POSITION FOR THE YAW CONTROLLER/INTERCOM BUTTON.		
WALLACE D.	JENKINS	VERY GOOD STABILITY IN PITCH, ROLL. HOVER HOLD AND VELOCITY STABILITY MADE IT EASIER (LESS PILOT WORK LOAD) THAN UH-60A.	CONTROLS (COLLECTIVE) ARE EXTREMELY SENSITIVE. DIFFICULT TO GAUGE THE AMOUNT OF FORCE REQUIRED TO GET DESIRED INPUT.	POSSIBLY SOME SORT OF LIMIT ON CONTROL MOVEMENT (FORCE REQUIRED).			
ARNOLD E.	MEAD	OVERALL HELICOPTER ATTITUDE MUCH MORE STABLE. TRANSITIONS TO VARIOUS ROLL ATTITUDES WAS CRISP AND POSITIVE. SYSTEM WAS STABLE IN ROLL RATES AND TURN RATES PRECISE. EASY TO BECOME CONFORTABLE WITH SYSTEM.	TRANSITION FROM FORWARD FLIGHT TO HOVER WOULD TAKE SOME PRACTICE. CONSTANT COLLECTIVE AXIS CONTROLLER PRESSURE FOR DESCENT SEEMED TO BE JUST OPPOSITE OF THE GOALS/CAPABILITIE OF THE SYSTEM (ALT HOLD ON). NOSE UP/DOWN INPUTS IN STABILIZED TURN SEEMED TO DRIVE A/C OUT OF TRIM.	EASIER ACHIEVEMENT OF STEADY STATE CLIMBS/DESCENTS WITH ALT HOLD ON. EXPAND SYSTEM TO 3-AXIS AUTO PILOT TYPE CAPABILITIES.	THE CAPIBILITY TO ENGAGE A STABILIZED HOVER (HDG HOLD, VEL STAB, HOVER, AND RADAR ALT HOLD) VIA ONE SWITCH/BUTTON ON THE 3-AXIS CONTROLLER. TAKE AWAY THE NUMBER OF OPTIONS A PILOT HAS - ie. TOO MANY CHOICES.		
ROBERT E.	EVANS	EVERYTHING, ESP. WORKLOAD REDUCTION.	WE DO NOT HAVE IT YET ON OPERATIONAL A/C!	YAW RESPONSE SEEMED SMOOTHER TO THE RIGHT THAN TO THE LEFT.	INTERCOM SWITCH ON RIGHT-HAND CONTROLLER SHOULD BE ON BOTTOM OF SWITCH INSTEAD OF TOP, FOREASE OF OPERATING. ADD VIA (VOICE INTERACTIVE AVIONICS).	TREMENDEOUS IMPROVEMENT OVERALL - ESP. IN COCKPIT WORKLOAD REDUCTION THATS CRUCIAL FOR NOE REQUIREMENTS.	ADD VIA. NEED 2-3 HOURS OF FLIGHT FOR BETTER EVALUATION. BRIEFING WAS SIMPLY SUPERB - FOR BOTH TECHNICAL AND OPERATIONAL UNDERSTANDINGS.
THOMAS M.	ALMOJUELA	AFTER GETTING SOMEWHAT FAMILIAR WITH THE SYSTEM I WAS ABLE TO SIGNIFICANTLY RELAX ON THE CONTROLS AND WORKLOAD SIGNIFICANTLY DECREASED DEPENDING ON MODES SELECTED. ESPECIALLY EVIDENT IN HOVER ASSIST MODE.	IT WAS PROBABLY DUE TO MY OWN CONTROL INPUT BUT I FELT THE SENSITIVITY IN YAW WAS MORE NOTICEABLE AS COMPARED TO PITCH AND ROLL. VERY NOTICEABLE AT HOVER AND AT CRUISE. HOWEVER WITH MORE TIME I'M SURE I COULD MAKE THE CONTROL INPUT A LOT	SINCE THIS WAS MY FIRST TIME WITH THE SYSTEM, I'M NOT SURE I COULD RECOMMEND ANY IMPROVEMENTS. MAYBE A SLIGHT DECREASE IN THE SENSITIVITY IN YAW. PROBABLY RELATES TO TRANSITIONING YAW CONTROL FROM THE FOOT PEDALS TO THE CYCLIC.		ONCE YOU REALIZE WHAT THE SYSTEM WOULD DO FOR YOU, I FOUND PILOT WORKLOAD SIGNIFICANTLY REDUCED.	

ADOCS USER DEMONSTRATION
PILOT EVALUATION COMMENTS

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CHAN	MORSE	VERY EASY TO FLY, PARTICULARLY SMOOTH W/ALL AFCS MODES ENGAGED. TRANSITIONS SMOOTH WITH EXCEPTION OF YAW IN SOME CONDITIONS.	SMOOTHER. HIGH BUTTON WORKLOAD, YAW KICKS W/SMALL CONTROL INPUTS & CONTROL REVERSALS, LACK OF TURN COORDINATION BELOW 40 KTS AND THE ABRUPT TRANSITION FROM LATERAL CONTROL = TURN RATE TO LATERAL CONTROL = BANK ANGLE W/O YAW RATE.	MORE AUTOMATIC MODE TRANSITIONS. YAW & TURN COORDINATION WORK. MORE FEEDBACKS IN VERTICAL, CONSIDER: VERTICAL VELOCITY HOLD & ALT CAPTURE < TBD, VERTICAL VELOCITY OR FLIGHT PATH ANGLE.	TURN COORDINATION AT LOW SPEED. MORE 4+D WORK.		COMMENT WERE MADE IN DEBRIEF W/ J. BISHOP, N. ALBION, G. JERALLD.
TERRY L.	JONES	HOVER ASSIST WOULD BE A REAL AID DURING EXTERNAL LOAD/RESCUE HOIST OPERATIONS. BARO ALT HOLD IS EXCELLENT FOR INSTRUMENT FLIGHT. HEADING HOLD WITH THIS SYSTEM IS FAR SUPERIOR TO CURRENT UH-60 SYSTEM.	YAW EXCURSION DURING NOE FLIGHT TEND TO REQUIRE PILOT TO MAKE INADVERTANT LONGITUDINAL ADJUSTMENT TO TRY AND MAINTAIN YAW CONTROL.	THE VERTICAL AXIS CONTROL (COLLECTIVE) AS DESIGNED, REQUIRES PILOT TO DIVIDE HIS ATTENTION IN AND OUT OF THE COCKPIT (DUE TO THE LACK OF REAL FEEL OF APPLIED PITCH IN THE SYSTEM) TO AVOID OVER-TORQUE OF THE ENGINE.	A FORCE GRADIENT OF SOME SORT IN THE VERTICAL AXIS.		
CHANDLER C	SHERRELL	SYSTEM ENABLES YOU TO GREATLY REDUCE PILOT WORKLOAD. HAVING NOT FLOWN A UH-60 PRIOR TO TEST FLIGHT, RETENTION BETWEEK FIRST AND SECOND FLIGHT WAS VERY GOOD. ALLOWED QUICK LEARNING CURVE IN ADAPTING TO THE SYSTEM AND AIRCRAFT. MUCH GREATER CONTROLLABILITY AND HANDLING RESPONSE. SELECTABLE MODES GREATLY ENHANCE PILOT CONTROL AND TECHNIQUE IN BOTH UTILITY AND SCOUT/ATTACK MODES.		MORE RESEARCH AND IMPROVEMENT IN YAW CONTROL TO ALLOW FOR GREATER CONTROL IN QUICK POWER CHANGES DURING HIGH SPEED MANUEVERING. ADDITIONAL WORK TO POSSIBLY CHANGE PEDALS IN RIGHT SIDE OF AIRCRAFT TO ANOTHER MODE IF YAW CONTROL IS CONTROLLED THROUGH RIGHT STICK.	VERY IMPRESSED WITH ALL AFCS FUNCTIONS. ADDITIONAL FEATURES WOULD GREATLY ENHANCE NOE AND TERRAIN FLIGHT MODES BY ADAPTING FORWARD LOOKING ATTITUDE HOLD. LOW LEVEL FLIGHT COULD BE GREATLY IMPROVED. CURRENT PILOT WORKLOAD IS GREATLY REDUCED WITH AFCS BUT ADDITIONAL CAPABILITIES WOULD GREATLY ENHANCE PILOT CAPABILITIES.	DID NOT PERFORM PFCS NOR AIR TO GROUND TARGETING. ALSO DID NOT PERFORM SLOPE LANDINGS. COMMENTS ON NOE PERFORMANCE STATED EARLIER.	HOVER ASSIST WOULD GREATLY ENHANCE TARGET ACQUISITION IN SCOUT MODE AND ALSO OVERWATCH AND COVER ASPETS. ALT HOLD IS EFFECTIVE IN BARO. BUT RADAR COULD USE FURTHER ADAPTATION. HEADING HOLD & VEL STAB GREATLY INCREASE PILOT EFFECTIVENESS AND AIRCRAFT CONTROL.
LORAN A.	HAWORTH	DE-COUPLED RESPONSE SYSTEM. HOVER "HOLD" IF YOU EXCLUDE THE DRIFT PROBLEM. HEADING HOLD, TURN COORDINATION, ROLL RATE/ATTITUDE IN TURNS, ALTITUDE HOLD.	CROSS COUPLING IN THE YAW AXIS, CONTROLLER IS DISPLACED TOO FAR TO THE RIGHT SIDE PROBABLY LEADING TO SOME YAW CROSS COUPLING. POSITION DRIFT WITH HOVER HOLD ENGAGED. WHEN THE A/C IS DECELERATING BELOW 3.5 KTS AND HOVER HOLD IS ENGAGED, THE PILOT SHOULD BE ABLE TO DETECT THE POSITIONING RESPONSE (POSITIVE CUES). DIFFICULTY IN MAINTAINING COORDINATED FLIGHT ESPECIALLY WITH THE YAW IN LOW AIRSPEED MANEUVERING FLIGHT. HAD TO LOOK INSIDE THE A/C FOR	INCREASED HOVER CAPTURE VELOCITY TO @ 5 KTS. PROVIDE SLIGHTLY MORE AGGRESSIVE RATE FOR HOVER CAPTURE SO PILOT WILL HAVE A POSITIVE INDICATION OF CAPTURE. ADJUSTABLE POSITIONING OF ARM REST AND CONTROLLER TO ACHIEVE BETTER PILOT TO CONTROLLER INTERFACE. WITH ATITUDE HOLD ENGAGED THE MANEUVER ENVELOPE IS VERY LIMITED DUE TO POWER CHANGES WITH TILTING OF THE LIFT VECTOR - ENVELOPE NEEDS TO BE INCREASED. WORK ON TOUCH DOWNS, CLOSE TO BEING UNCONTROLLABLE AT TIMES.	LOOK AT INCORPORATION OF A RATE COMMAND/ALTITUDE STABILIZATION SYSTEM - GOOD SYSTEM FOR LOW AIRSPEED MANEUVERING WHEN GOOD VISUAL CUES ARE PRESENT. ADD TO THE CONTROL LOGICS SO A SWITCH DOESN'T HAVE TO BE PRESSED EVERYTIME YOU WANT SOMETHING ELSE. FOR EXAMPLE TRYING AUTO ENGAGEMENT OF HOVER HOLD BELOW 5 KTS. LOOK AT KICKING OFF ALTITUDE HOLD WHEN SUDDEN MANEUVERING IS REQUIRED AS IN A PITCH OVER - COULD ENGAGE AGAIN WHEN PILOT LEVELS OUT. WE HAVE TRIED SOME OF THESE IN THE	ALTITUDE HOLD AND POWER INCREASES DURING MANEUVERS, AND YAW COORDINATION BIGGEST PROBLEM. HOWEVER REALIZE MY HOUR LEVEL IN YOUR SYSTEM.	VERY GOOD JOB OF IMPLEMENTING MODES. THANKS FOR TIME AND LETS TRADE IDEAS IN THE FUTURE. SEE YOU AT AMES SOMETIME. CALL ME IF YOU HAVE SUGGESTION ON AUTO MODES, AUTO SELECT, SO ON. ALSO LETS TALK ABOUT THE RATING IF YOU HAVE QUESTIONS.

ADOCS USER DEMONSTRATION
PILOT EVALUATION COMMENTS

FIRST NAME	LAST NAME	LIKES	DISLIKES	IMPROVEMENTS	ADDED FEATURES	NO COMMENTS	MODES COMMENTS
			POWER CUES. CONSTANT PRESSURE AGAINST CONTROLLER (VERTICAL) FOR CLIMBS OR DESCENTS WITH ALT HOLD ENGAGED.		SIMULATOR. LOOK AT DISPLACEMENT CONTROLLER ALSO.		
JAN	DRABCZUK	A/C RESPONSIVENESS IN THE PITCH AND ROLL AXES. MODE FLYING THE A/C EASY WHEN PERFORMING ROLL REVERSALS AND QUICK A/C AIRBORNE FLIGHT TASKS. PILOT WORKLOAD BOTH IN HOVER AND FORWARD FLIGHT WAS REDUCED THROUGH THE USE OF THE SIDEARM CONTROLLER AND THE AFCS.	THE YAW SENSITIVITY WAS POOR. VERY LITTLE FORCE WAS REQUIRED TO PLACE THE A/C IN UNCOORDINATED FLIGHT. SIMILAR VERY LITTLE FORCE/DISPLACEMENT IS REQUIRED ZERO TO FULL TORQUE. THE SYSTEM WAS VERY EASY TO OVER TORQUE. THE SYSTEM ALSO DEACTIVATED WHILE PERFORMING QUICK RESPONSE TASKS LIKE A QUICK STOP.	FURTHER RESEARCH IS NEEDED TO OPTIMIZE THE FORCE/DISPLACEMENT TRAVEL IN THE VERTICAL CONTROLLER TO ACCOMMODATE FLIGHT MISSION TASKS. YAW CONTROL SENSITIVITY ALSO NEEDS TO BE REDUCED FOR COORDINATED FLIGHT ABOVE 40 KTS.	MORE AUTOMATIC CONTROL OF INTERACT BETWEEN VARIOUS FLIGHT MODES (HOVER AND FORWARD FLIGHT CONTROL SENSITIVITYS AUTOMATICALLY CONTROLLED TO PROVIDE AN EASIER PILOT TRANSITION BETWEEN MODES). HANDS ON SELECT OF MANUAL FLIGHT MODES WITH THE CAPABILITY TO DESELECT AUTOMATIC FEATURES. NICE TO HAVE AN AUTO BOB-UP FEATURE.	I FEEL ALL THE ABOVE TASKS COULD BE COME LEVEL I HANDLING QUALITIES IF THE SENSITIVITY OF THE YAW AND VERTICAL AXES WAS OPTIMIZED.	THE A/C CONTROLLABLE AND SOMEWHAT EASY TO FLY WITH ALL OF THE MODES DESELECTED. USING THE MODES DEFINITLY DECREASED PILOT WORKLOAD BOTH AT A HOVER AND IN FORWARD FLIGHT.
CHARLES T.	JONES Jr.	EASY TO ADJUST TO THE ARM CONTROLLERS. SIGNIFICANTLY REDUCES PILOT WORKLOAD IN ALL OPERATIONS AND PROVIDES EASIER ACCESS TO INSTRUMENT PANEL BOTH VISUALLY AND PHYSICALLY.	THE VERTICAL AXIS HAS NO FEEDBACK AND IS VERY DIFFICULT TO DETERMINE POWER DEMAND POSITIONS. THE YAW AXIS CONTROLLER REQUIRES MORE FORCE TO MOVE FROM TRIMMED POSITION AND APPEARS TO HAVE MUCH FASTER RATE THAN PITCH/ROLL.	PROVIDE FEEDBACK IN THE VERTICAL AXIS. IMPROVE YAW FORCES AND REDUCE SENSITIVITY. IMPROVE YAW STABILITY IN FLIGHT MANEUVERS.	BEEP TRIM WOULD REDUCE PILOT WORKLOAD IN INTENSIVE HOVER AND IMPROVE AIRSPEED ACCURACY IN FLIGHT. BEEP TRIM IN THE VERTICAL AXIS WOULD IMPROVE THE TRANSIENTS DURING HOVERING, AIR TAXI, GROUND TAXI, WITH THE LACK OF VERTICAL FEEDBACK. WITH PROPER VERTICAL AXIS FEEDBACK, MAY NOT BE SIGNIFICANT IMPROVEMENT.	YAW AXIS NEEDS TO BE IMPROVED IN SENSITIVITY AND FORCES REQUIRED TO COMMENCE. PITCH AND ROLL MORE CLOSELY REPRESENTATIVE IN YAW. PFCS FLIGHT AS GOOD AS SAS/BOOST OFF.	HOVER ASSIST NEEDS MUCH IMPROVEMENT TO ADEQUATLY PROVIDE OPERATIONS IN CLOSE TERRAIN/NOE OPERATIONS. DRIFT STABILITY MUST BE MORE ACCURATE AND FEEDBACK IN THE VERTICAL AXIS IMPROVED BEFORE HOVER ASSIST WILL BECOME SIGNIFICANT IMPROVEMENT FOR CLOSE IN TERRAIN OBSTACLE WORK.
ROBERT S.	WRIGHT	GRATLY REDUCES PILOT WORKLOAD ONCE SYSTEM IS LEARNED. SIDEARM CONTROL ALLOWS A LARGE AREA TO PERFORM ADDITIONAL TASKS. THE FEATURE I LIKED MOST WAS HOW EASY IT WAS TO ADAPT TO THE SYSTEM.	IT IS DIFFICULT TO MAKE LEFT & RIGHT HAND PEDAL TURNS AT A HOVER WITHOUT INADVERTENTLY MAKING LATERAL AND LONGITUDINAL INPUTS.	I WOULD			
JOHN S.	BURKS	ROLL CONTROL IN FORWARD FLIGHT EXCELLENT. HEADING HOLD IN ALL MODES. SELECTABLE MODES (CAN YOU USE THEM IN COMBAT AREAS ? - DOPPLER RADIATION).	TURN COORDINATION IN FORWARD FLIGHT NOT GOOD. UNABLE TO PRECISELY TRIM TO PREDETERMINED PARAMETER (A/S, TORQUE, R/C, ECT.). YAW CONTROL RESPONSE TOO SENSITIVE, TOO EASY TO COUPLE WITH PITCH & ROLL. NO POSITIVE FEEDBACK FOR COLLECTIVE CONTROL IN FORWARD FLIGHT. POSITION/USE OF RADIO/ICS SWITCHES ON CYCLIC/RHG CAUSES CONTROL	FIX TURN COORDINATION TO KEEP BALL CENTER W/O USE OF YAW COMMAND. PROVIDE TRIM FUNCTION FOR PRECISE CONTROL - THUMB WHEEL OR BEEPER OR WHEEL ON CONTROLS WITH POSITIVE FEEDBACK. FIX THE YAW CONTROL OR GIVE IT BACK TO MY FEET! TRY PIVOT AT ELBOW? PROVIDE POSITIVE POSITION FEEDBACK IN COLLECTIVE - UP & DOWN WITH DETENTS YOU CAN FEEL. PUT	GIVE THE FEET SOMETHING TO DO! RADIO/ICS SWITCHES (CONVENIENTLY LOCATED AND DESIGNED) OR MODE SWITCHING FOR A MULTIFUNCTION DISPLAY, IFF SQUAWK TOGGLE, ECT. ADD A CROSS HAIR INSTRUMENT SHOWING EQUIVALENT STICK POSITION FROM CENTER FOR REFERENCE/FEEDBACK. USE SPACE BETWEEN LEGS & LOWER TOP OF GLAZE SHIELD FOR BETTER VISABILITY.	DIFFICULT TO TRIM TO PRESICE PARAMETERS SUCH AS A/S BECAUSE THERE IS NO POSITIVE FEEDBACK - CONTROLS WORK LIKE INTEGRATORS WITH A LAG. FOR PRESICE TRIMMING, AFCS NEEDS FINE TRIM MODE.	I QUESTION WETHER THE DOPPLER/RAD ALT MODES ARE USEFULL / CAN ALWAYS BE USED IN COMBAT DUE TO RF EMISSION.

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			INPUTS/COUPLING. DIFFICULTY IN WORKING CONTROLS TO TAXI.	RADIO/ICS SWITCHES ON FLOOR OR REPOSITION THEM ON HAND GRIPS.			
DAVID	FUNK	EMI/EMP PROTECTION. SAVES WEIGHT.	NOTHING	MORE FEEL, A BIT LESS SENSITIVITY.	NONE	COLLECTIVE SENSITIVITY ON APPROACHES SEEMS TO BE A PROBLEM.	SIGNIFICANTLY REDUCES PILOT WORK LOAD.
DAVID	BEISHLINE	VERY STABLE, SIDE CONTROLS VERY EASY TO FLY VERY PREFERABLE TO CONVENTIONAL HELICOPTER CONTROL IN THE 3+1 MODE.	YAW CONTROL LESS THAN OPTIMIZED.	LATERAL ACCELEROMETERS TO IMPROVE YAW.	NEEDS DISPLACEMENT CUES TO GIVE PILOT FEEDBACK AS TO LIMITS OF ROTOR SYSTEM. MORE ACCURATE SYSTEM THAN DOPPLER TO ELIMINATE DRIFT IN HOVER MODE.		VEL STAB, HOVER ASSIST, AND RAD. ALT. VERY HELPFULL IN NOE FLIGHT REDUCES PILOT WORKLOAD.
CHARLES	KIND	THE RESPONSE OF THE A/C IN ROLL AND PITCH AXES WERE EXTREMELY QUICK AND SMOOTH. THE CHANGES IN A/S AND VERTICAL SPEED WERE EASY TO CHANGE AND MAINTAIN. WITH VEL STAB, HOVER AND RAD ALT MODES ON THE PILOT WORK LOAD WAS NEAR NIL, FREEING ME UP.	IT SEEMED LIKE THE TWIST MOTION ON THE YAW CONTROL WAS HARD TO GET USED TO. EVERYTIME I MADE A YAW INPUT I HAD A TENDENCY TO INCLUDE A LATERAL INPUT. WAS DIFFICULT TO GET A PURE YAW INPUT. ALSO WAS DIFFICULT WITHOUT SOME VISUAL STICK DISPLACEMENT ESPECIALLY WITH JUST PFCS, TENDED TO OVER CONTROL IT.	SOME TYPE OF CHECK OR CROSS CHECK BETWEEN THE COLLECTIVE MOVEMENTS AND ROTOR RPM. WITH THIS RESPONSIVE OF A SYSTEM, COULD GET INTO ROTOR OVER OR UNDER SPEED A BIT EASIER. ALSO SOME VISUAL MEANS OF STICK DISPLACEMENT. SOMETHING TO TUNE VEL SATB AND HOVER MODES INTO BESIDES DOPPLER TO MINIMIZE DRIFT.	ADJUSTABLE HEIGHT AND WIDTH DISPLACEMENT OF THE ARM REST. SOME TYPE OF FORWARD LOOKING ALTIMITER SO COULD HAVE TERRAIN FOLLOWING ON RADAR ALT.		THESE MODES WOULD ESPECIALLY IDEAL FOR SCOUT/ATTACK MISSIONS, REDUCING PILOTS LOAD TO NEAR NOTHING. EXCELLENT!
JOHN A.	MACRIKO	HEADING HOLD FEATURE. LONGITUDINAL RESPONSE AND A/S HOLD.	APPARENT DISSYMMERTY IN ROLL AND YAW RESONSE, MAY BE DUE TO LACK OF ADOCS FLIGHT TIME.	FLY THROUGH VEL STAB THEN DESELECT IF ATT/ATT RATE REQUIRED FOR A/A. RATE COMMAND FOR VERTICAL AXIS.		NOT ENOUGH EXPOSURE TO FLIGHT EVALUATE TO MORE CONSTRUCTIVE COMMENTS.	
MATTHEW M.	McGUIRE	STABILITY, OVERALL RESPONSIVENESS AND WORK LOAD REDUCTION. WITH THE EXCEPTION OF THE COLLECTIVE, THE 3-AXIS CYCLIC ALLOWS FOR RAPID HABIT TRANSFER.	YAW INPUT RESPONSE. IT SEEMED THAT PART OF THE INPUT WAS NULLED OUT. ADDING MORE INPUT THAN NEEDED TO COMPENSATE OFTEN RESULTING IN RAPID RESPONSE WITH ALL INPUT FORMER (NULLED) AND LATTER PROVIDED COLLECTIVELY.	YAW RATE RESPONSE (SEE DISLIKES).			
R.	HEATH	THE OVERALL STABILITY OF THE UH-60 WITH THE ADOCS IS GREATLY IMPROVED. THE ADOCS DYNAMIC STABILITY WILL GREATLY ENHANCE THE IMC AND MISSION PROFILE OF THE AIRCRAFT.	THE FORCE CONTROL COLLECTIVE DOES NOT ALLOW THE PILOT TO DETERMINE HIS TORQUE SETTINGS BASED UPON COLLECTIVE POSITION.	SOME SORT OF COLLECTIVE DISPLACEMENT WOULD PROVIDE FOR A "POWER FEEL". THE PILOT SHOULD BE ABLE TO CONCENTRATE OUTSIDE THE AIRCRAFT. THE FORCE CONTROL COLLECTIVE DOES NOT ALLOW THIS. DESENSITIZING THE YAW CONTROL WOULD ENHANCE GROUND HANDLING QUALITIES.	HEAD HOLD ON GROUND. BE ABLE TO SELECT GROUND SPEED OR AIR SPEED FOR THE VEL STAB FUNCTION. FIND A MORE SIMPLE RUN-UP PROCEDURE. BE ABLE TO ADJUST THE ARM CONTROLLERS IN ADDITION TO THE SEAT ADJUSTMENT.		
JAMES R.	D'AGOSTINO	THERE WAS EXCELLENT CONTROL RESONSE IN A ALL AXES. IT WAS HARD TO MAINTAIN A CONSTANT SMOOTH RATE OF TURN IN THE	SLOPES WERE DIFFICULT WITHOUT A REAL "FEEL" FOR THE CONTROLS. SHALLOW SLOPES WERE NOT BAD BUT A STEEP	I WOULD ASK FOR A NON-TRIM HOVER (A CONTINUOUS CONTROL INPUTS ON HOVER) IN CYCLIC CONTROL (NO DETENT) TO	MOVE THE POSITION OF THE ICS SWITCH ON THE CYCLIC. IT IS DIFFICULT WHEN MAKING A LATERAL OR LONGITUDINAL		

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		YAW AXIS, WITHOUT BEING JERKY AT A HOVER.	SLOPE WOULD BE TRICKY.	PROVIDE FOR CONTINUOUS FEEL OF THE A/C. WITH SOME KIND OF SWITCHING TRANSIENT SO IN FORWARD FLIGHT TRIM (DETENT) WOULD AUTOMATICALLY BE PHASED IN. AND FOR THOSE TIMES WHEN YOU WOULD NEED OR DESIRE TRIM (DETENT) AT A HOVER, THE PILOT WOULD BE ABLE TO MANUALLY ENGAGE IT, ON THE MSSP.	INPUT TOGETHER WITH A YAW INPUT AND TALK ON THE ICS INTO ALLY.		
MARK	EHRHART	ONCE A MODE IS SELECTED (ie. HOVER W/ RAD ALT) A/C IS STABLE ENOUGH TO ALLOW PILOT TO PERFORM OTHER "IN COCKPIT" TASKS. SIDEARM CONTROLLER TO ME IS ACCEPTABLE AND I THINK I COULD ADJUST IN A FEW HOURS.	SIDEARM/SYSTEM SENSITIVITY NEAR THE GROUND, I FEEL CAN CAUSE PROBLEMS ESPECIALLY IN A "TIGHT" (ie. HOSTILE) ENVIRONMENT. ROLL/YAW CROSS CONTROL IN UP AND AWAY TURNS. DEPENDANCE ON ENGINE TORQUE FOR FEEL OF PITCH POSITION.	ERGONOMIC ADJUSTMENT OF SIDEARM CONTROLLER TO PROVIDE LESS CROSS CONTROL. MORE FLIGHT TEST TO INCLUDE SLING LOAD, GUNNERY, ETC. SYSTEM PROTECTION FOR DC/AC TRANSIENTS.	A "DEGREE OF PITCH" INDICATOR TO SHOW ROTOR POSITION INDEPENDANT OF ENGINE TORQUE.	EXCELLENT REAL WORLD STABILITY IN ALL PHASES OF FLIGHT.	
TOM	DAVIS	A/C CONTROL CHARACTERISTICS WERE, OVERALL EXCELLENT. AFCS WAS VERY IMPRESSIVE. WAS SURPRISED THAT LEARNING CURVE WAS SO QUICK ON LEARNING SYSTEM OPERATION AND HANDLING QUALITIES.	YAW CONTROL WAS A SLIGHT PROBLEM SOMETIMES. HAD TENDENCY TO PUT A/C OUT OF TRIM ON STEEP TURNS AND OVER CONTROL DURING LANDINGS ON FIRST FLIGHT. CHANGING GAIN OR ADDITIONAL TRAINING ON SYSTEM MAYBE ALL THAT IS NEEDED.	WOULD LIKE TO FLY A/C WITH EXTERNAL LOAD. SYSTEM NEEDS COLLECTIVE STICK POSITION INDICATOR.	WOULD LIKE TO SEE DEMO OF A/C CAPABILITIES BY PILOT WITH RELATIVILY HIGH TIME ON SYSTEM. NON-RATED UH-60 PILOTS SHOULD NOT BE PROHIBITED FORM PERFORMING LANDING OPERATIONS.	COLLECTIVE STICK INDICATOR NEEDED FOR SOME MODES.	
JOE	LYLE	VERY GOOD STABILIZATION. EASY TO ADAPT TO. GOOD CONTROL RESPONSE. PFCS SEEMS BETTER THAN BASIC UH-60.	REQUIREMENT TO MONITOR POWER WHEN MAKING LARGE INPUTS. OCCASIONALLY VERY SENSITIVE IN YAW. SEEMED TO OCCURE WHEN WORKING MULTIPLE AXIS (NOT A DISLIKE)	DIGITAL A/S READOUT WITH BEEP CAPABILITY. ANNUNCIATOR PANEL ABOVE ATTITUDE INDICATOR FOR MODE STATUS.	4+0 CAPABILITY A PART OF USER DEMO WITH LEFT SIDEARM CONTROLLER. SOME TYPE OF SIGHT FOR AIR/GND AIR/AIR. INTEGRATE WITH FLIGHT DIRECTOR.	PILOT IN THE LOOP SHORT TERM TOUCH ALL UP SYSTEM. PITCH SEEMS MORE SENSITIVE THAN ROLL BUT NOT A PROBLEM. DIFFICULT TO BE AGGRESIVE WITH SYSTEM NOE, MAYBE YAW SENSITIVITY.	VERY GOOD SYSTEM. ENJOYED FLYING IT VERY MUCH WOULD RECOMMEND UH-60 CURRENCY/QUALIFICATION BE RESINDED. PILOT (GUEST) PROGRAM IS GREAT AND WELL RUN.
JOHN	HAGEN	PITCH AND ROLL CHARACTERISTICS IN ALL MODES OF FLIGHT. REDUCED HOVER WORKLOAD WITH SELECTABLE MODES.	DIFFICULTY IN ESTABLISHING DESIRED POWER SETTING FOR LEVEL/CLIMB/DESCENT IN FORWARD FLIGHT. DIFFICULTY IN ACCOMODATING TO DIRECTIONAL CONTROL WITH PITCH/ROLL IN SINGLE CONTROL. DIFFICULTY IN PRECISELY MODULATING VERTICAL CONTROL DURING TAKEOFF/LANDING MANEUVERS (VERT.,RUNNING,SLOPED). DIFFICULTY IN COORDINATING NECESSARY CONTROL INPUTS DURING GROUND TAXI.	IMPROVED REFERENCE SYSTEM FOR HOVER ASSIST. DIRECTIONAL CONTROL CHARACTERISTICS.			

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JAMES L.	WEBRE	THE ADOCS SYSTEM IS AN EXCELLENT CONCEPT FROM THE STAND POINT OF REDUCTION OF WEIGHT AND EMI/EMP. MANY OF THE AFCS MODES OF ADOCS REDUCED PILOT WORKLOAD SIGNIFICANTLY. WITH FURTHER AFCS SHAPING THE CONTROL WOULD GIVE THE PILOT EXACTLY WHAT HE NEEDS TO ACCOMPLISH THE MISSION. ALT HOLD WORKED VERY WELL.	YAW AXIS WAS DIFFICULT (TOO SENSITIVE & NOT HARMONIC) AS COMPARED TO PITCH & ROLL AXIS. COLLECTIVE DID NOT PROVIDE FEEDBACK TO PILOT AS TO THE POWER THAT IS BEING APPLIED TO A/C (OTHER THAN ENGINE SOUND AND A/C RESPONSE). IN HEADING HOLD YAW CONTROL WAS ERRATIC. AGGRESIVE CONTROL MOVEMENT (DOING NOE/PILOT IN THE LOOP) WAS DIFFICULT AN INDUCED PIO. HOVER ASSIST HAD SLIGHT DRIFT. GROUND TAXI WAS DIFFICULT TO CONTROL.	SYSTEM SHOULD BE INTEGRATED TO PROVIDE AUTOMATIC MODE SWITCHING WITHOUT THE PILOT RELEASING HAND FROM COLLECTIVE AND PUSHING BUTTONS. VEL STAB COULD PROBABLY BE ELIMINATED. YAW AXIS CONTROL RESPONSE AND SENSITIVITY NEEDS TO BE IMPROVED FOR UP AND AWAY AND GROUND OPERATIONS.	HEADING RETENTION AS APPOSED TO HEADING HOLD SHOULD BE AVAILABLE IN ALL MODES OF FLIGHT (EXCEPT WHEN THE PILOT IS IN THE LOOP). THIS WILL PROVIDE HIM WITH A REFERENCE HEADING THAT MAY DRIFT SLIGHTLY BUT IS NOT AS RIGID AS HEADING HOLD.		LIKE THESE MODE STO BE AUTOMATIC INSTEAD OF HAVING TO SELECT THEM. SOME TYPE OF FORWARD LOOKING TERRAIN FOLLOWING MAY BE MORE VALUABLE THAN RAD ALT.
WILLIAM J.	MARCHBANK	THE BEST PART OF THE SYSTEM IS THE REDUCTION OF PILOT WORKLOAD! ALSO THE REDUCTION OF MOVING PARTS WILL DESREASE BOTH THE POSSIBILITY OF FAILURE AND THE WEIGHT OF THE A/C. THE USE OF FIBER OPTICS REDUCES AN A/C VULNERABILITY TO EMI WHICH IS A MUST WITH THE SYSTEM.	THE LACK OF FEEL IN THE CONTROLS IS A PROBLEM WITH THE SYSTEM. FOR EXAMPLE, IF I HAD A SLING LOAD MISSION AND HOVERED OVER A LOAD IT WOULD BE VERY EASY TO OVER-CONTROL THE A/C AND HURT SOMEONE. (ie. TOO MUCH DOWNWARD PRESSURE ON THE COLLECTIVE CAUSING A DESCENT OF THE A/C POSSIBLY CRUSHING THE SLING MAN UNDER THE A/C)	I WOULD TAKE WHAT YOU HAVE DONE AND CONTINUE TO FINE TUNE AS YOU ARE DOING AND I WOULD TRY TO TIE CONTROLS MORE RANGE TO GIVE THE PILOT A BETTER FEEL FOR THE CONTROLS.	A COMPLETELY AUTOMATIC PILOT THAT A WOULD ALLOW THE PILO TO GO HANDS OFF MOST OF THE TIME. THIS WOULD ALLOW THE 4 AXIS CONTROL TO BECOME A REALITY.	ALL OF THE HANDLING QUALITIES ARE GREAT BUT WE HAVE NOT TRIED THIS AT NIGHT WITH NVG's AND UNDER OUR MISSION PROFILE. I THINK THE NEXT STEP SHOULD BE TESTING AT NIGHT IN DIFFERENT MISSION PROFILES.	ALL OF THESE ARE A MUST IF WE ARE TO PERFORM OUR MISSION. THE SYSTEM IS EASY TO FLY DURING THE DAY AND NON-TACTICAL MODES. HOWEVER, IF THE PILOT WAS REQUIRED TO PERFORM A MISSION AT NIGHT WITH LITTLE REST AND WITHOUT ALL OF THESE MODES AVAILABLE TO HIM HE MIGHT NOT BE ABLE TO COMPLETE THE MISSION.
MANUAL P.	ROSAS	THE ELIMINATION OF WEIGHT. THE ELIMINATION OF CONTROL RIGGING. THE ELIMINATION OF COMPONENTS WHICH WEAR OR COULD FAIL. SAVED MANHOURS REQUIRED FOR PRESENT DAY TECHNOLOGY. THE EASE OF LOCATING A BROKEN LINE. LIMIT OF DOWN TIME IN QUICK REPAIR. REDUCTION OF PILOT WORKLOAD. EMI/EMP PROTECTION REDUCTION. SURVIVABILITY THRU REDUNDANCY. QUICK BATTLE DAMAGE REPAIR.	NOTHING, IT HAS GREAT POTENTAL IN PROVIDING THE NECESSARY CONTROL DEMANDED BY THE NEXT GENERATION OF A/C IN A COMPLEX BATTLEFIELD ENVIRONMENT.	A SELECTABLE CONTROL PANEL FOR BAROMETERIC ALTITUDE SELECTION AND FORWARD LOOKING RADAR COUPLED TO RADAR ALTIMETER FOR NOE/NVG OPERATIONS OR COMPUTER IMAGE INTERPERTATION ABILITY COUPLED INTO FLIR SYSTEMS.	A 4+0 CONTROL ARM DESIGN TO OPERATE ALONG THE NATURAL AXIS OF THE HUMAN ARM, WRIST, HAND, AND FINGERS AS DESCRIBED TO CPT.(P) G. JERAULD, AND MR. P. LASALA. FULLY AUTOMATIC YAW TRIM ABOVE 60 KTS.	EVEN THOUGH I WAS OVER CONTROLING ON LANDINGS FROM A HOVER I FIRMLY BELEIVE THAT WITH A FEW MORE HOURS OF FLYING I COULD LAND IT SMOOTHLY. MY SCORE OF "A" IS BASED ON THIS A/C, I'M SURE THAT WITH FUTURE DEVELOPING IT WILL BE EVEN BETTER. RECOMMEND THAT AFTER FURTHER IMPROVEMENTS ARE MADE SOME OF THE SAME PEOPLE BE RETURNED TO FLY AND COMMENT ON THE IMPROVEMENTS.	WITH FUTURE IMPROVEMENTS WITH A BETTER DOPPLER SYSTEM C,D,E WILL IMPROVE. I WOULD LIKE TO SEE A SELECTABLE ALTITUCE CONTROL.
MICHAEL J.	HUTSON	RAD ALT HOLD, VEL STAB AND OTHER HOVER AIDS ARE OUTSTANDING. RESPONSIVENESS IN FLIGHT CONTROL IS VERY GOOD.	(FLT 1) I FELT THE YAW CONTROL DURING GROUND TAXI OPERATIONS WAS TOO SENSITIVE. (FLT 2) IT TURNS OUT THAT THE YAW CONTROL WAS NOT MY PROBLEM. ONCE I	(FLT 1) I PERSONALLY WOULD LIKE TO SEE A LITTLE MORE FEEL IN THE SYSTEM. HOWEVER I COULD PROBABLY OVERCOME THIS ATTITUDE WITH A LITTLE MORE TRAINING. (FLT 2) THERE	FOR MISSION TASKS - MOST IMPORTANTLY EXTERNAL LOAD OPERATIONS - THE RAD ALT HOLD SHOULD BE COUPLED TO A DIGITAL RAD ALT SO EXACT ABSOLUTE ALTITUDES COULD BE		THIS IS A SYSTEM - REGUARDLESS OF THE TYPE OF THE FLIGHT CONTROLS USED - THAT THE ARMY NEEDS NOW. JUST THE REDUCTION IN PILOT WORKLOAD WOULD SIGNIFICANTLY

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			COORDINATED POWER, PITCH AND YAW I HAD VERY LITTLE DIFFICULTY IN GROUND TAXI OPERATIONS.	IS NO DOUBT NOW THAT I FEEL THIS SYSTEM IS TRAINABLE. THE "FEEL" WILL COME AFTER MORE FLYING WITH THE SYSTEM.	MAINTAINED.		ENHANCE ARMY AVIATOR MISSION ACCOMPLISHMENT.
BRIAN J.	BARKLAGE	GROUND TAXING WAS EASIER THAN IN A CONVENTIONAL UH-60. THE OVERALL RESONSE OF THE A/C WAS EXCELLENT.	IN HTE VERTICAL AXIS, NOT HAVING A COLLECTIVE POSITION REFERENCE MADE LANDINGS FEEL UNCOMFORTABLE. THE SENSITIVITY OF THE LEFT HAND CONTROL WOULD MAKE SOME OPERATIONS MORE DIFFICULT (ie. SLING LOAD DURING THE HOOK UP AND RELEASE PHASES).	USE THE ADOCS SYSTEM WITH CONVENTIONAL CONTROLS.		AIR TO GROUND TARGETING WAS DIFFICULT BECAUSE THIS WAS A FIRST TIME MANEUVER FOR ME.	BARO ALT HOLD WAS A GREAT HELP AT ALT INC/DEC A/S WAS PRETTY SIMPLIFIED. HOVER ASSIST WORKED GREAT WHEN HOLDING IN THE TREES. WITH A LITTLE MORE TIME (5-10 HRS) I COULD BECOME VERY COMFORTABLE WITH THE A/C.
RONALD K.	ANDRESON	CONTROL RESPONSE AND STABILITY.	A BIT SENSITIVE TO PILOT INPUTS WHICH MAKE HOVER, LANDING AND PROBABLY NOE WORKLOAD SOMEWHAT HIGHER THAN IT COULD BE.	A SOMEWHAT SOFTER RESPONSE - NOT MUCH THOUGH - TO PILOT INPUTS.			
DOUGLAS W.	HELMS	STABILITY AND EASE OF CONTROL; VERY EASY TO LEARN WITH RETENTION OF CONTROL OPERATION. WAS ABLE TO ESTABLISH CONFIDENCE IN SYSTEM VERY QUICKLY.	SEEMED JERKY IN SOME MODE OF FLIGHT ALTHOUGH PROBABLY IS A RESULT OF SHORT TIME IN A/C. LACK OF TACTILE FEEL.	FINE TUNING OF CURRENT SYSTEN CAPABILITIES. IMPROVE ANTI-DRIFT IN HOVER. PERMIT HANDS OFF CLIMBS, DESCENTS IN BARO MODE.	EFIS TYPE "BUGS" FOR DIRECTIONAL AND ALTITUDE CONTROL CHANGES. ALLOW PILOTS TO "DIAL IN" NEW HEADINGS OF ALTITUDES. FORWARD LOOKING RADAR.	EXCELLENT OPERATIONS FOR THIS STAGE OF DEVELOPMENT FINE TUNING REQUIRED, BUT CURRENT SYSTEM CERTAINLY PROVES CONCEPT.	GOOD SYSTEM BUT GENERALLY NEED FINE TUNING. CERTAINLY PROVED PROOF OF CONCEPT.
AUGUSTINE	CIANCIOLO	EASY TO USE.	YAW CONTROL WAS NOT AS GOOD AS OTHER AXES.	INPUT FORCE REQUIREMENTS FOR SIDEARM CONTROLLER SHOULD BE ADJUSTABLE. I FOUND THEM TO BE A LITTLE TOO STIFF.			
CARL E.	ALLEN	VERY CONTROLLABLE TO FLY. VERY GOOD STABILITY WISE - HOVER AND INFLIGHT. WAS EASY FOR ME TO ADAPT TO BASED ON MY EXPERIENCE WITH THE CH54 AFT SEAT.	I FELT THE YAW CONTROL SYSTEN WAS TOO SENSITIVE WHEN AN INPUT WAS MADE. MAYBE THE RATE OF THE INPUT COULD BE REDUCED vs. AMOUNT OF CONTROL DISPLACEMENT.				
FRANK H.	MAYER	THE R+D WORK THAT WAS BEEN DONE TO HELP ANSWER FLIGHT CONTROL DESIGN QUESTIONS. I BELIEVE THAN MUCH MORE COULD BE DONE W/ADOCS TO GIVE MORE INSIGHTS.	PILOT FEEDBACK AND CUES SO HE KNOWS WHAT HE IS DOING TO THE A/C WITH CONTROL INPUTS.	VARY INPUT MOVEMENT AND SENSITIVITY.	MORE WORK ON 4+0 AND PROVIDE FOR AUTO HOVER HOLD.	WITHOUT COLLECTIVE FEEDBACK TO PILOT THE OVERALL OPERATIONAL ABILITY OF THE ADOCS DESIGN MUST BE MODIFIED. I AM NOT CONVINCED THAT 3+1 IS BETTER THAN 4+0 IF THE SENSITIVITY IS CORRECTED AND USER FREINDLY.	
WALLACE H.	STONEBURG	TOTAL REDUCTION OF PILOT WORKLOAD ONCE ADJUSTED TO NEW FLIGHT CONTROLS. ONE TIME INPUT OF CONTROL FORCE TO ATTAIN DESIRED PITCH OF ROLL AND THEN FORGET IT, IT WILL REMAIN CONSTANT. CAN SEE A REAL NEED FOR SUCH A SYSTEM WITH EXTERNAL LOAD	PILOT SEAT SEEMED TO SLOPE FORWARD. SINCE I AM TALL AND HAVE LONG ARMS IT WOULD BE NICE IF HAND HELD CONTROLS WERE MOUNTED MORE FORWARD. INTERCOM BUTTON ON PILOT'S CYCLIC IS TOO HIGH FOR COMFORTABLE HAND POSITION.	AM TOO NEW TO THIS SYSTEN TO RECOMMEND IMPROVEMENTS AT THIS TIME.	COULD HEADING HOLD FEATURES BE LINKED TO COURSE WINDOW INDICATION ON HSI THROUGH AN ADDITIONAL SWITCH.	A/C SEEMED TO DRIFT WHILE DOING BOB-UP MANEUVER. ALSO SENSED SMALL ROLL CHANGE. VERY HARD TO TELL SINCE OVERALL TIME AT ACTUAL CONTROL WAS LIMITED TO 1 HR. AND TO OVERCOME INBITS FORMED IN ACTUAL UH-60 TO ACCOMPLISH LANDING FROM	HEADING HOLD, HOVER ASSIST, AND BAD ALT HOLD COULD ALL REDUCE PILOT WORKLOADS DURING MOST MODES OF TERRAIN FLIGHT AND EXTERNAL LOAD OPERATIONS. I DON'T THINK I WOULD USE VEL STAB THAT MUCH. BARO ALT HOLD WOULD BE GREAT FOR INSTRUMENTS.

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PILOT EVALUATION COMMENTS

FIRST NAME	LAST NAME	LIKES	DISLIKES	IMPROVEMENTS	ADDED FEATURES	NO COMMENTS	MODES COMMENTS
R.I.	NORTON	OPERATIONS. EXCELLENT HANDLING QUALITIES FOR THE LOW GAIN TASK. I BELEIVE THAT HIGH GAIN TASKS ARE NOT POSSIBLE DUE TO THE DOCS MONITOR TAILORED HANDLING QUALITIES. COMFORTABLE SEATING POSITION. TRIM BACK-UP, GOOD. ACCURATE BARO HEIGHT HOLD. TURN COORDINATION. VERSATILITY.	VERTICAL AXIS INMPTOR - NO POSITION FEEDBACK. YAW AXIS TOO SENSITIVE. HIGH CONTROL FORCES MADE FINE TUNING DIFFICULT. 3+1 CONTROL METHOD, I PERFER THE 2+1+1 ESPECALLY FOR MULTI AXIS MANEUVERING. MODE ENGAGE PANEL ON CENTER CONSOLE, SHOULD BE SMART OR VOICE COMMAND. STILL NOT FULLY DECOUPLED!	DISPLACEMENT COLLECTIVE. YAW TRIM. SPEED TRIM. REDUCE CONTROL FORCES. ADJUSTABLE INCEPTOR POSITION. STIFFER YAW CHANNEL. MORE DE-COUPLING PARTICULARLY COLLECTIVE TO PITCH, PITCH TO ROLL, YAW TO ROLL (IN HOVER). REDUCE PHYSICAL CROSS-COUPLING IN THE CYCLIC INCEPTOR. IMPROVE THE YAW CHANNEL CONTROL LAWS SUCH THAT 3+1 CONTROL PHYLOSOPHY IS ACCEPTABLE.	IMPROVE "MODE SELECT" FEATURE PLUS HEADS UP INDICATION OF AFCS STATUS. TORQUE COMMAND SYSTEM. TRIMMABLE COLLECTIVE (PERHAPS SLAVED TO A BUG ON THE HEADS UP ALTIMETER). HOVER TRIM FOR LOW AIRSPEED. SPEED BEEP FOR UP AND AWAY. HEADING ACQUIRE MODE?	HOVER TASK. MANY OF THESE MANEUVERS WERE VERY VERY EASY TO PERFORM. THOSE THAT I HAVE ASSESSED LEVEL 2 ARE MAINLY DEGRADED BY THE YAW CHANNEL AND A GOOD CRUISE MODE OR YAW TRIM MAY WELL SOLVE THE PROBLEM. AUTOROTATION CAUSED A SYSTEM TRIPS BECAUSE I KEPT THE LEVER DOWN BELOW ITS BOTTON STOP. A GOOD EXAMPLE OF THE POOR POWER CUES PRESENTLY PROVIDED.	THE MODES WERE USEFUL AND IMPROVED TASK PERFORMANCE WHILE REDUCING WORKLOAD. I RATE THE HOVER ASSIST A LEAST USEFUL BUT THEN I HAVE NOT FLOWN THIS AIRCRAFT IN THE MISSION DURING DARKNESS OR POOR WEATHER. THE METHOD OF MODE SELECT/DESELECT WAS POOR, THE LAST THING A PILOT WANTS TO DO IN THE HOVER (MAYBE IN CONFINED AREAS IN TURBULANCE), IS LOOK INTO THE COCKPIT AND TAKE HIS HANDS OFF THE CONTROLS. IN SUMMARY, I FEEL THAT THE AIRCRAFT DEMONSTRATED EXCELLENT HANDLING QUALITIES FOR LOW GAIN TASKS. I WAS NOT ABLE TO FLY VERY AGGRESSIVELY, DUE TO THE DOCS MONITOR, BUT FEEL THERE MAY BE PROBLEMS WITH MULTI-AXIS MANEUVERING.
WILLIAM A.	CREEK	RAD ALT HOLD IS THE GREATEST FEATURE. THIS IS A GREAT HELP IN THE SCOUT/ATTACK ROLE. LIKEWISE ON THE BOB-UP & HOVER HOLD.	ROLL ON LANDINGS WERE VERY DIFFICULT. THE PRECISE YAW CONTROL IS GREAT BUT IT HINDERS ROLL ON CAPABILITIES.	CREATE A CONSTANT PITCH ANGLE THAT THE PILOT CAN SET FOR GROUND TAXI INSTEAD OF HOLDING CONSTANT PRESSURE. I CAN FORE SEE PILOTS PROBLEMS IN CHANGING THE FLIGHT CONTROL LAWS DURING FLIGHT. THIS FEAUTRE IS NICE & IS NEEDED BUT THE PILOT NEEDS TO BE VERY AWARE IF RAD ALT IS ON OR NOT.			
RAY	DUNN	COCKPIT SEEMED SPACIOUS WITH SIDEARM CONTROL. UP AND AWAY ROLL RESPONSE WAS CRISP AND DEADBEAT. AIRSPEED HOLD WAS GOOD ONCE ESTABLISHED. VEL STAB AND HOVER HOLD WORKED WELL.	COLLECTIVE DIFFICULT TO SET POWER AT SPECIFIC SETTINGS - NO CUES AS TO POWER DEMANDED (WAS TO KEEP CHECKING GAGES). NOT SURE HOW YOU WOULD HANDLE IN AUTOROTATIONAL TOUCHDOWN. YAW TENDENCY TO GET IN THE LOOP AND OVER CONTROL IN HOVER. VERY DIFFICULT TO SMOOTHLY LAND FROM A HOVER, PUSHING ON COLLECTIVE FELT UNNATURAL AND ROLL/YAW WERE OVER CONTROLLED.	MAKE COLLECTIVE DISPLACEMENT TYPE. PILOT ISN'T DOING ANYTHING WITH THE FEET - GIVE HIM YAW CONTROL. BALL IS CONSISTENTLY OUT TO THE RIGHT (.25-.5), CORRECT. FOLLOWING LONGITUDINAL INPUT, AIRCRAFT RETURNS TO "LEVEL" ATTITUDE TOO FAST. AIRCRAFT TURNED LEFT 3-4 DEGREES WHEN POWER INCREASED UP & AWAY - FIX.	ABILITY TO ESTABLISH AND MAINAIN A RATE TURN IN HOVER. RELEIVE PILOT FROM HAVING TO HOLD FORCE (LONGITUDINAL) FOR LARGE AIRSPEED CHANGES. MAKE SYSTEM MORE TOLERANT TO LARGE ABRUPT CONTROL INPUTS. IN HIGH STRESS/WORKLOAD SITUATIONS SUCH AS BOB UP (WHEN SOMEONE IS SHOOTING AT YOU) OR AIR TO AIR COMBAT ABRUPT MOVEMENTS WILL NOT BE UNUSUAL. IF DISPLACEMENT COLLECTIVE IS NOT FEASIBLE	AUTOROTATIONAL RATE C SINCE I SUSPECT THE PILOT WILL HAVE A DIFFICULT TASK MAKING A TOUCHDOWN WHILE OPTIMIZING USE OF ROTOR RPM. OTHER PROBLEMS ARE CAUSED BY REQUIREMENT TO HOLD LONGITUDINAL FORCE AND QUICK ATTITUDE CHANGE WHEN LONGITUDINAL FORCE IS RELEASED.	ALL CONTRIBUTE TO REDUCE PILOT WORKLOAD. A SHORT SYSTEM DESCRIPTION HANDOUT THAT GUEST PILOTS COULD REVIEW PRIOR TO FLIGHT WOULD BE HELPFUL.

ADOCS USER DEMONSTRATION
PILOT EVALUATION COMMENTS

FIRST NAME	LAST NAME	LIKES	DISLIKES	IMPROVEMENTS	ADDED FEATURES	NO COMMENTS	MODES COMMENTS
					THEN FORCE COLLECTIVE SYSTEM MUST PERMIT PRECISE POWER ADJUSTMENTS.		
GARY	JERAULD	ROLL STABILITY WAS OUTSTANDING. ALL SELECTABLE MODE REDUCE PILOT WORKLOAD TO A GREAT EXTENT.	COLLECTIVE INPUTS ARE TOO DIFFICULT T MODULATE UP AND AWAY. ie. THERE ARE NO TACTILE CUES TO LET YOU KNOW WHAT POWER SETTING IS DOING FOR YOU (WITHOUT CONSTANTLY LOOKING AT THE TORQUE STRIPS.)	DISPLACEMENT COLLECTIVE. CHANGE THE LOCATION OF THE MSSP TO THE FRONT CONSOLE TO PRECLUDE "TAKING YOURS EYES FROM OUTSIDE THE COCKPIT TO INSIDE".		DID NOT FLY PFCS OR DO SLOPE LANDINGS OR TAKEOFFS.	
ROBERT L.	RAYBURN	SIDEARM CONTROL - FEELS MORE NATURAL THAN A CONTROL WHEEL. CONTROL RESPONSE - THOUGHT THAT SENSITIVITIES WERE GOOD FOR ME IN ALL AXES BUT VERTICAL WHICH I PERCIEVED A SLIGHT LAG BETWEEN INITIATING A FORCE ON MY FINGER TIPS & GETTING A RESPONSE ON THE ALTIMITER AND TORQUE METER. VERY NICE IFR PLATFORM - AIRSPEED AND ALTITUDE HOLD FEATURES.	CONTROLLER GRIP VIBRATING, WHEN HANDS OFF, WAS UNCOMFORTABLE TO WATCH EVEN THOUGH NO INPUTS WERE GETTING INTO THE SYSTEM. COLLECTIVE GRIP ORIENTATION - THINK IT NEEDS TO BE SLIGHTLY MORE ANGLED DOWN. CROSS COUPLING INTO YAW DUE TO CYCLIC GRIP DESIGN.	TORQUE SENSING WITH AIRCRAFT COMMANDED ALTITUDES FED INTO SOME ARTIFICIAL INTELIGENCE FOR VERTICAL AXIS TO ALLOW ALTITUDE HOLD FOR STRAIGHT/LEVEL AND/OR DEC MANEUVERING (MILD) THEN RELEASE THE ALTITUDE HOLD FOR AN ACCELERATION OR RATE CONTROL. HAVE AIRSPEED HOLD PILOT SELECTABLE AND THE NORMAL MODE BE ATTITUDE HOLD FOR PITCH.	SEE IMPROVEMENTS COMMENTS. AUTOMATIC MODE SELECTION; ALTITUDE AND HEADING PRESELECT CAPABILITY; COUPLE INTO AN AUTOPILOT.	DID NOT GO INTO GROUND EFFECT OR ATTEMPT A FLARE MANEUVER ON AUTOROTATION. CLIMBS AND DESCENTS WERE DONE WITH SMALL CHANGES IN ALTITUDE (<1500 FT).	
LES	SCOTT	CONTROL RESPONSE IN THE ROLL AXIS - GOOD SENSITIVITY, PREDICTABLE, ADEQUATE RATES.	CONTROL RESPONSE IN YAW - REQUIRED TOO MUCH COMPENSATION & ADAPTING.	DON'T KNOW - GOOD SYSTEM.	NONE		
TIMOTHY A.	KRAATZ	CLEAR VIEW OF INSTRUMENT CONSOLE AIDS MISSION CAPABILITIES. HANDS-OFF FLYING ALLOWS A SINGLE PILOT TO PERFORM ADDITIONAL TASKS (TUNE RADIOS, ECT.). OUTSTANDING STABILITY, WOULD BE FANTASTIC UNDER INC.	YAW CONTROL IS SOMEWHAT AWKWARD BUT COULD BE OVERCOME WITH EXPERIENCE.	REFINED YAW COUPLING TO IMPROVE COORDINATED FLIGHT.	AN ALTITUDE HOLD THAT WOULD ALLOW USER TO SELECT AN ALTITUDE FOR LEVEL-OFF MANEUVER.		INSTRUCTOR PILOT/SAFETY PILOT (JOHN BISHOP) DID A COMMENDABLE JOB DURING THE DEMONSTRATION FLIGHT. WELL VERSED IN THE SYSTEM PERFORMANCE AND ABLE TO CLEARLY COMMUNICATE THE SAME.
DOUGLAS A.	CAHILL	OUTSTANDING SYSTEM. I REALIZE THE SYSTEM HAS BEEN INSTALLED ON THE WORST AIRCRAFT DO TO DESIGN OF THE TAIL ROTOR ON THE UH-60. I WAS EXTREMELY PLEASED WITH THE PERFORMANCE AND OFFER THE FOLLOWING COMMENTS.	IN FLIGHT FOR COORDINATED FLIGHT THE BALL MUST BE DRIVEN BACK TO THE CENTER. THIS COULD BE AUTOMATIC IN COORDINATED FLIGHT WITHOUT PILOT INPUT AT LOW SPEED AND HOVER.	COORDINATED CONTROL OF ALL AXIS IN FLIGHT COULD BE IMPROVED HARMONIZED COUPLING OF INPUTS.	AS A FOLLOW ON CONSIDER THE FOUR AXIS SIDE ARM CONTROLLER. THE PROJECT SAFETY PILOT, JOHN BISHOP, PERFORMED HIS MISSION IN AN OUTSTANDING MANNER. HIS ABILITY TO DEMONSTRATE THE SYSTEM IS SUPERB.	SEE COMMENTS ON QUESTIONNAIRE.	SEE COMMENTS ON QUESTIONNAIRE.
BRUCE	BLAKE	PRECISE ROLL RESPONSE. AUTOMATIC FORCE TRIM VERY GOOD. GOOD GRIP GEOMETRY & COMFORTABLE ARM REST ARRANGEMENT GOOD HOVER ASSIST MODES.	FORCE POWER LEVER RESPONSE DYNAMICS FORCE PILOT TO MONITOR GAGES. JERKY YAW RESPONSE WITH HEADING HOLD ON. SHORT TERM INTERAXIS COUPLING WITH RAPID INPUTS.	DISPLACEMENT COLLECTIVE. CRITICAL PARAMETER LIMITING THRU AFCS (TORQUE, RPM).			